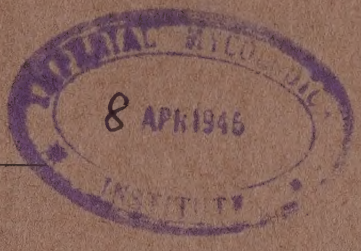
1945.

QUEENSLAND



FORTY-FIFTH ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

REPORT OF THE DIRECTOR

TO

THE HON. THE SECRETARY FOR AGRICULTURE AND STOCK

(*As required by "The Sugar Experiment Stations Acts*, 1900 *to* 1941").

PRESENTED TO PARLIAMENT BY COMMAND.

BRISBANE:
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FORTY-FIFTH ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK.

SIR,—I have the honour to submit the Forty-fifth Annual Report of the Bureau of Sugar Experiment Stations for the period 1st July, 1944, to 30th June, 1945. Submission has been delayed by the late compilation of final sugar returns, caused by shipping difficulties.

ARTHUR F. BELL,
Director.

Brisbane, 18th October, 1945.

Director's Report.

General.

In common with the rest of the community, producers of cane sugar have experienced some slight but tangible amelioration of rigorous wartime conditions. The field manpower position has been difficult and unsatisfactory, but is improving, while the material and supply position has shown distinct improvement. The general northward movement of Allied troops also greatly relieved the strain imposed upon the State's transport system and the necessity for intermill transfers of cane should not arise this season.

Crushing of the 1945 crop commenced at the Herbert River Mills on 30th May and, with the exception of Invicta, all mills north of Mackay were in operation by 21st June; in several instances commencement of crushing was delayed by rain. The Manpower Directorate has again aimed at providing sufficient field labour to permit crushing to proceed at 75 per cent. normal pre-war rate, and reports at 30th June indicated that this was being attained in the aggregate, although two or three mills were not well served. This position is a distinct improvement on that of the same time last season. On the other hand, some of the labour employed in northern mills was temporarily transferred from the central districts, where a drought delayed crushing until August, and their return will complicate the position in the far north.

The winter of 1944 was mild and little frost damage resulted. Good winter rains were received in the north, and in most of the southern districts, and this was followed by good spring rains in the north and a fair season in the south. The wet season broke early in the wet tropics and the first three months of the year were characterised by very heavy and excessive rainfalls; it will be noted that all areas from Mossman to Ingham had an unusual number of wet days and recorded precipitation far in excess of the annual average. Summer rainfall was generally deficient in the south, but a mild winter, with reasonable rainfall, has been responsible for some late growth of crops.

The central district of Mackay-Proserpine has experienced severe drought conditions following a light rainy season in the early part of 1944; the current year's registration was little more than half normal. Crops are light in consequence and the commencement of crushing was delayed until August.

The subjoined table sets out monthly, total, and average rainfall, as well as the number of wet days, recorded in the chief centres of sugar cane production.

TABLE I.—RAINFALL DATA FOR CHIEF CENTRES OF CANE PRODUCTION, JULY, 1944—JUNE, 1945. REGISTRATIONS ARE RECORDED IN INCHES AND HUNDREDTHS OF AN INCH.

Centre.	July,	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	Total for 1944-45.	Average Annual Total.	No. of Wet Days.
Mossman ..	5·73	1·14	3·42	2·59	0·89	10·14	22·41	17·91	54·17	4·63	6·06	1·51	130·60	92·76	178
Cairns.. ..	2·54	1·28	4·48	1·60	1·14	4·14	23·22	27·52	48·13	6·05	8·75	2·15	131·00	88·75	167
Babinda ..	6·01	7·58	9·22	4·00	2·02	17·28	40·08	48·98	70·94	23·93	15·15	5·73	250·92	166·17	167
Innisfail ..	6·58	6·24	5·88	2·96	0·62	8·78	26·14	44·88	66·06	15·73	9·33	3·68	196·88	143·78	177
Tully	7·68	9·82	7·97	5·77	2·02	4·65	27·43	36·67	75·09	26·33	16·97	6·66	226·97	180·71	146
Ingham ..	3·25	1·94	2·56	1·35	0·07	2·33	8·79	33·06	39·85	4·38	5·40	3·52	106·50	79·92	139
Giru	0·75	0·64	0·08	0·48	0·44	6·07	4·17	15·15	15·67	1·14	0·48	3·53	48·60	45·96	40
Ayr	0·28	0·66	0·00	0·43	0·00	5·50	4·12	16·59	15·60	1·35	0·16	3·40	48·09	41·54	59
Proserpine ..	0·84	2·76	2·30	0·50	0·07	3·93	5·98	6·55	20·78	5·38	4·81	4·01	57·91	71·51	111
Mackay ..	0·57	0·68	0·75	0·46	0·59	2·56	3·37	3·12	13·32	2·81	2·80	4·24	35·27	66·91	94
Finch Hatton	1·29	2·05	0·08	0·42	0·65	1·60	5·25	2·35	12·21	3·01	2·20	6·08	37·19	61·49	80
Sarina ..	0·82	0·97	1·00	1·69	1·39	2·49	4·21	2·50	16·45	1·59	1·38	2·43	36·92	69·89	84
Bundaberg ..	2·82	1·61	0·81	1·28	1·88	3·84	4·91	7·42	0·78	0·65	2·02	1·00	29·02	43·47	83
Childers ..	2·90	0·96	1·58	1·21	1·35	4·57	3·38	12·21	1·10	2·52	1·60	1·49	34·87	41·78	111
Maryborough	4·36	1·48	1·26	1·21	3·76	5·69	7·79	6·95	3·41	1·95	2·94	2·66	43·46	45·63	111
Nambour ..	6·40	1·80	3·00	1·99	3·33	4·96	4·74	9·34	5·18	6·39	2·75	9·06	58·94	64·16	119
Beenleigh ..	5·18	2·20	2·94	1·10	3·23	1·68	1·98	6·07	1·44	2·82	3·59	9·77	42·00	47·49	91

Estimate of the 1945 Crop.

From data submitted by the mills in May it is estimated that a total of 4,445,500 tons of cane will be available for harvest from 242,300 acres. It may be anticipated that all available cane will be crushed, so that, assuming a ratio of seven tons of cane to one ton of sugar, the resultant crop should yield about 635,000 tons of sugar, calculated on the 94 net titre basis, or some 615,000 tons of bagged raw sugar. If these expectations be realised the crop will be somewhat less than that of the 1944 season, and slightly less than the target set for 1945 by the Commonwealth Government. That the crop will be less than early forecasts is due to the very unfavourable season experienced in the central districts—the current estimate of the 1945 crop for Mackay-Proserpine being 790,000 tons of cane as compared with an actual crushing of 1,110,481 tons in 1944. In the mill areas north of Townsville the aggregate 1945 estimates are 2,058,450 tons, while the 1944 crushing was 1,819,552 tons; similar figures for the Lower Burdekin are 688,000 and 589,970 tons, respectively, and for southern district 909,050 and 878,187 tons.

Actual crushings for the 1944 season and estimated crushings for the 1945 season are set out below. Restrictions on the transport of cane for milling were again imposed in 1944, but to a much less extent than in 1942 and 1943. Under these restrictions a quantity of cane was hauled to the nearest mill rather than to the mill to which the cane land in question is assigned. It has therefore been necessary to continue the practice of differentiating between actual and domestic crushings. The domestic crushing of each mill represents the quantity of cane which was harvested from land assigned to that particular mill, although a proportion may have been crushed by other mills. The actual crushing represents cane which passed through any particular mill's rollers irrespective of ownership. It is therefore the domestic crushing which should be read in conjunction with the crop estimates furnished for individual mills in last year's report.

TABLE II.—SUGAR CANE CROP HARVESTED, 1944—ESTIMATED, 1945 (TONS).

1944 Crop.		Mill.	1945 Estimate (Preliminary).
Domestic Crushing.	Actual Crushing.		
119,113	119,113	Mossman	125,000
129,901	129,901	Hambledon	170,000
190,073	190,073	Mulgrave	230,000
199,480	199,480	Babinda	200,000
166,437	166,437	Goondi	176,000
216,603	216,603	South Johnstone	229,450
137,542	137,542	Mourilyan	150,000
218,645	218,645	Tully	230,000
206,602	193,138	Macknade	266,000
235,156	248,620	Victoria	282,000
	1,819,552	District Total	2,058,450
75,082	75,082	Invicta	90,000
142,838	142,838	Pioneer	176,000
184,056	184,056	Kalamia	202,000
187,994	187,994	Inkerman	220,000
	589,970	District Total	688,000
162,777	162,642	Proserpine	130,000
173,263	174,550	Farleigh	130,000
163,412	162,677	Racecourse	100,000
167,572	167,872	Pleystowe	125,000
140,859	140,117	Marian	105,000
58,585	58,610	Cattle Creek	65,000
85,703	85,703	North Eton	45,000
158,310	158,310	Plane Creek	90,000
	1,110,481	District Total	790,000
157,469	157,729	Bingera	150,000
160,066	162,726	Fairymead	160,000
159,325	159,289	Millaquin	169,000
77,120	74,496	Qunaba	55,850
33,816	33,556	Gin Gin	40,000
146,378	146,243	Isis	151,200
46,193	46,649	Maryborough	50,000
26,476	25,878	Mount Bauple	35,000
63,586	63,863	Moreton	85,000
7,376	7,758	Rocky Point	12,000
382	..	Eagleby	1,000
	878,187	District Total	909,050
4,398,190	4,398,190	State Total	4,445,500

1944 Crop Statistics.

The serious downward trend in sugar production which commenced in 1940 was fortunately arrested in the 1944 crop, when 643,540 tons of 94 net titre sugar were produced, compared with 486,447 tons in the 1943 season. The ratio "tons of cane per ton of sugar" was 6.83, which is the best since 1940 and, in the circumstances of reduced harvesting rates and milling difficulties, was very satisfactory.

The following table records the distribution of production between the mill areas lying north (10) and south (23) of Townsville over the period 1940-1944:—

TABLE III.—SUGAR PRODUCTION, 1940–44.

District.	1940.	1941.	1942.	1943.	1944.
	Tons.	Tons.	Tons.	Tons.	Tons.
North of Townsville	309,437	305,819	263,908	206,634	259,573
South of Townsville	450,009	391,526	341,772	279,813	383,967
Total	759,446	697,345	605,680	486,447	643,540

The increase of nearly 160,000 tons of sugar over the 1943 crop was thus divided between the north and south zones in the ratio of about 1 : 2.

The area harvested for milling purposes was 222,215 acres; this represents a decrease of three per cent. over the area recorded for 1943. A further total of 10,762 acres was reported by mills as being cut for planting purposes. The harvested area was distributed among plant, ratoon, and standover cane as follows:—

	Per Cent.
Plant cane	43·6
Ratoon cane	51·15
Standover cane	5·25

Some improvements in labour and tractor supplies permitted an increase in areas planted during 1943, the proportion of plant cane harvested in 1944 being 43.6 per cent., compared with 33 per cent. in the 1943 crushing season. The yield per acre harvested for crushing purposes was 19.8 tons of cane and 2.9 tons of sugar. Corresponding figures for the previous season were 14.8 tons of cane and 2.125 tons of sugar. Details of average yields recorded in the several districts are as under:—

TABLE IV.—TOTAL AND ACREAGE YIELDS BY DISTRICT, 1944.

District.	Tonnage Crushed.	Tons Cane per Acre.	Tons 94 n.t. Sugar per Acre.
Mossman–Ingham	1,819,552	20·82	2·97
Lower Burdekin	589,970	26·66	4·17
Proserpine	162,642	17·02	2·67
Mackay	947,839	15·74	2·40
Bundaberg–Gin Gin	587,796	21·27	2·97
Childers–Maryborough	218,770	18·34	2·55
Nambour–Beenleigh	71,621	20·95	2·70
State Average	..	19·79	2·90

Production data recorded for the State during the ten-year period 1935-1944 are given below and it is pleasing to note that the sharp downward trend which has operated since 1939 has been arrested. As stated above, current estimates indicate that 1945 production will be of the same order as in 1944.

TABLE V.—ACRES CULTIVATED AND HARVESTED, YIELDS OF CANE AND SUGAR, ACRE YIELDS, AND QUALITY OF CANE, 1935–1944.

Year.	Acres Cultivated. *	Acres Harvested for Milling.	Total Yields.		Yields per Acre.		Tons Cane to 1 ton Sugar.
			Cane.	Sugar.	Cane.	Sugar.	
			Tons.	Tons.	Tons.	Tons.	Tons.
1935	314,700	228,515	4,220,267	610,326	18·47	2·67	6·92
1936	338,686	245,152	5,171,516	744,261	21·10	3·04	6·94
1937	348,840	249,683	5,132,934	763,325	20·56	3·06	6·73
1938	347,199	251,064	5,342,085	778,136	21·28	3·10	6·87
1939	353,996	261,047	6,038,821	891,422	23·14	3·41	6·77
1940	350,851	265,738	5,180,756	759,446	19·50	2·86	6·82
1941	334,787	246,939	4,793,589	697,345	19·41	2·82	6·87
1942	316,798	238,213	4,350,642	605,680	18·26	2·54	7·18
1943	326,478	228,895	3,397,424	486,447	14·84	2·125	6·98
1944	317,386	222,215	4,398,190	643,540	19·79	2·90	6·83
True Average for 10 years	334,972	243,746	4,802,622	697,993	19·70	2·85	6·88

* Data supplied by Government Statistician; figures for 1944 provisional.

The quantity of molasses used as a supplementary mill fuel was again higher than might have been expected during a period of shortage of fertilizers and liquid fuels, but this is accounted for by difficulties associated with storage and transport. The quantity used as stock feed showed a material increase and helped to relieve shortages of grain foods. The Government Statistician has supplied the following details of the disposal of molasses over the past ten years:—

TABLE VI.— DETAILS OF DISPOSAL OF MOLASSES FOR THE TEN-YEAR PERIOD, 1935–1944.

Method of Usage.	1935.	1936.	1937.	1938.	1939.	1940.	1941.	1942.	1943.	1944.
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.
Distilleries ..	4,617,431	6,086,864	7,071,109	8,275,887	9,581,241	11,531,396	12,882,397	10,457,747	7,345,596	9,136,862
Fertilizer ..	2,559,528	3,211,423	3,363,624	3,293,543	4,295,289	3,334,372	1,510,650	1,857,300	2,122,220	2,745,617
Stock Feed ..	3,817,755	4,351,822	3,914,113	4,237,196	4,727,170	5,380,242	3,490,937	3,071,918	3,055,728	4,719,517
Mill Fuel ..	4,103,475	6,354,841	5,576,764	3,748,590	3,834,653	1,781,425	1,232,338	3,024,370	2,176,926	2,251,737
Other Purposes..	175,519	397,080	157,496	232,049	188,889	228,450	158,821	303,240	441,522	254,358
To Waste ..	1,214,678	560,326	466,481	498,926	457,541	47,069	55,237	31,153	97,643	16,660
Total ..	16,488,386	20,962,356	20,549,587	20,286,191	23,084,783	22,302,954	19,330,380	18,745,728	15,239,635	19,124,751

Sugar Values in 1944.

The total value of the 1944 sugar output is computed by the Sugar Board to be £12,740,000, the average price for all sugar being £19 16s. 1d. on the 94 net titre basis. The quantity sold in No. 2 Pool (that is, sugar produced by mills in excess of their "peaks" but produced from cane grown on assigned land) was 13,300 tons, while 22 tons of "excess" sugar was manufactured from cane grown on non-assigned land. The average price of No. 1 Pool sugar was £19 18s. 1d., and of sugar surplus to Australia's domestic requirements, £15 0s. 6d. per ton.

Economic Review.

The 1944 season was characterised by definite signs of a return to normalcy. A materially increased crop was associated with a somewhat improved position in respect of manpower, tractors, materials, fertilizer, and transport facilities. Although a number of mills commenced operations on a two-shift basis, all but six operated three shifts for at least the greater part of the season. The arithmetic mean of the average weekly crushing rates of all mills was 74.3 per cent. of the adjudged normal rate, compared with 66.3 per cent. for the 1943 season. Individual mill crushing rates (excluding one small mill) ranged from 51.9 per cent. to 90.1 per cent.

Quality of cane was the best for some years, and the State average commercial cane sugar content of cane was 15 per cent.—the highest since 1937. The standard of factory work improved slightly, thus arresting the progressive decline of recent years. Pol extraction (95.48 per cent., or 95.38 per cent. reduced extraction) was actually the highest yet recorded, which was no doubt due in part to the reduced crushing rate. Recovery figures and boiling house efficiency all improved, although still short of pre-Pacific War standards, as indicated hereunder:—

——	1944.	1943.	Approx. Average 1937–40.
Overall recovery	86·11	85·88	87·5
Overall recovery E.S.G.	85·81	85·54	87·1
B.H. efficiency	94·20	94·28	96·3
B.H. efficiency E.S.G.	93·91	93·94	95·9

Improvement in the availability of rolling-stock on the State railways reduced the necessity for diversion of cane to the nearest mill, as indicated in Table II. It is anticipated that such diversion will be virtually eliminated in the 1945

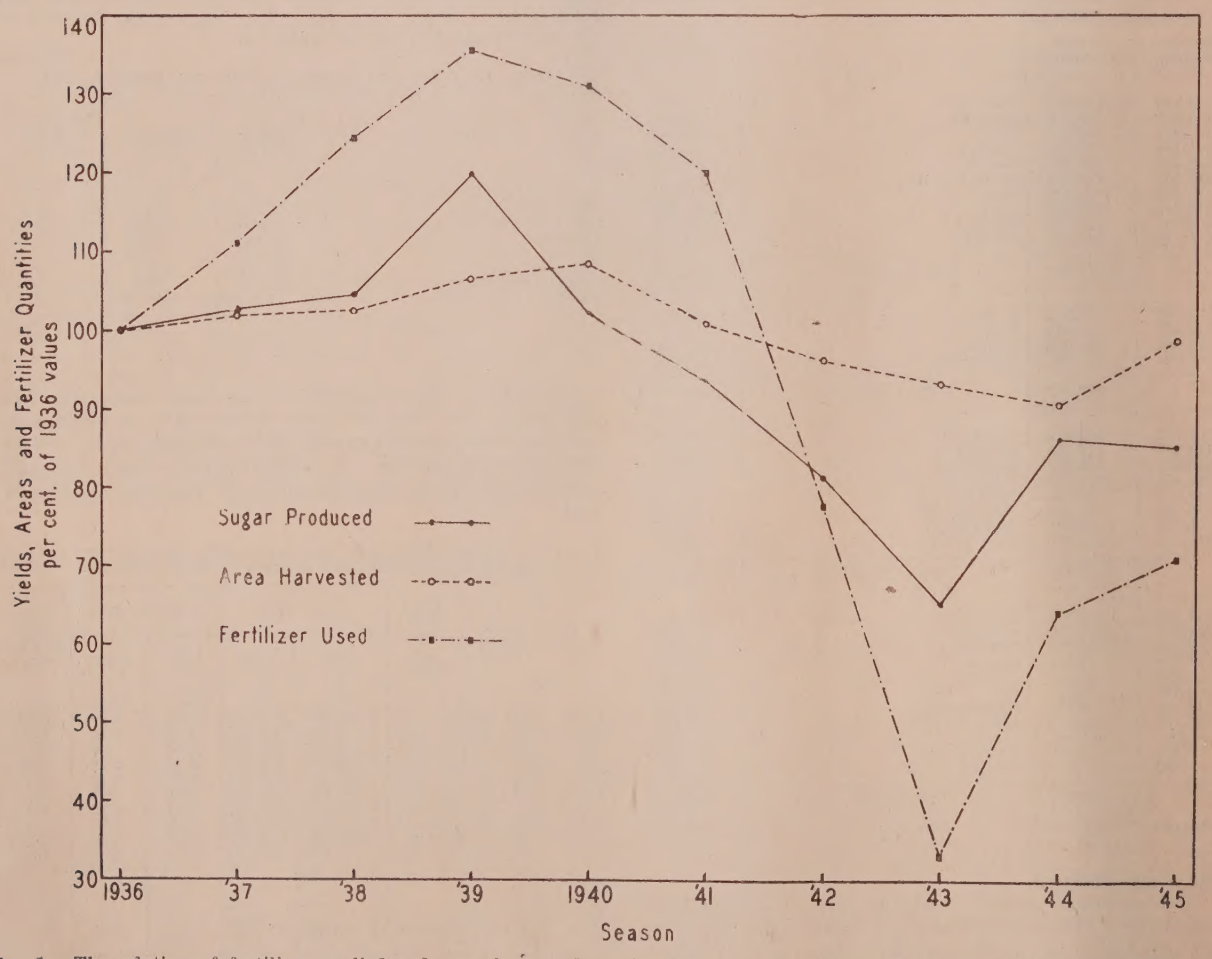

FIG. 1.—The relation of fertilizer applied and acres harvested, to the production of sugar in Queensland over the period 1936-1945 (see also Table VI.).

season. Lifting of sugar at ports was again slow, and had not been completed at all mills when the current season opened; however, mill storage capacity again proved adequate to demands.

Deliveries of fertilizer for the calendar year 1944 showed a further increase, and a total of 32,006 tons was delivered. This quantity was made up as follows:—

	Tons.
Nitrate of soda	15,727
Sulphate of ammonia	4,221
Superphosphate	5,598
Meatworks manure	4,620
Potash	1,840
Total	32,006

Owing to general shipping and man-power deficiencies this fertilizer was received rather late in the season and so could not be used to the best advantage for the 1945 crop.

In the reports for 1943 and 1944 there were reproduced tables and graphs showing the close interdependence of sugar crop and fertilizer supplies. These data are again submitted in Table VII. and Fig. 1. It will be seen that the same general relationships have held, although the droughty conditions which prevailed in the central and southern districts and the excessively wet season in the northern tropics have materially reduced the estimates for the 1945 crop below that would normally have been expected.

TABLE VII.—RELATION OF PRODUCTION TO AREA HARVESTED AND FERTILIZER SALES FOR THE YEARS 1936–1945. (*See also* Figure 1.)

Season.	Tons Sugar Made.	Acres Harvested.	Tons Sugar per Acre.	† Tons Fertilizer.
1936	744,261	245,152	3·04	45,090
1937	763,325	249,683	3·06	50,000
1938	778,136	251,064	3·10	56,000
1939	891,422	261,047	3·41	61,000
1940	759,446	265,738	2·86	59,000
1941	697,345	246,939	2·82	54,000
1942	605,680	238,213	2·54	35,000
1943	486,447	228,895	2·125	15,000
1944	643,540	222,215	2·90	29,000
1945	*635,000	*242,000	..	32,000

* Estimate.

† Approximate sales for previous year; the effect of fertilizer is seen in the crop harvested the year following its purchase and application.

As recorded in last year's report, an enquiry into the matter of payment of a subsidy to the sugar industry to meet increasing costs of production was made by the Tariff Board at the direction of the Commonwealth Government. The Board heard evidence in Brisbane and Mackay in June-July, 1944, and submitted its report in September. The finding of the Board was that while the sugar industry had been adversely affected by the war, it could not be said to have suffered unduly in relation to other sections of the community and that, in consequence, there was no justification for the payment of a subsidy at this juncture.

The scheme for the reconditioning and return of tractors, which had been impressed from the sugar industry for war emergency purposes, was continued by the Allied Works Council. In all a total of nearly 150 such tractors has been returned to date. Some relief has also been afforded by the release of new tractors, but very few heavier type tractors have been available.

The rationing of sugar was continued at the domestic ration of one pound per person per week, the purpose of the restriction being the accumulation of sugar for export to Britain. The production target for 1945 was increased to 650,000 tons of bagged raw sugar, and it appears unlikely that this figure will be materially exceeded. The target for 1946 has been increased to 725,000 tons.

Work of the Bureau.

The staffing of the Bureau has undergone material adjustment during the period under review. Dr. H. W. Kerr, who had been engaged in wartime work in connection with processed food standards since January, 1943, tendered his resignation in April. His association with the industry since 1924 has been a continuous record of meritorious service, and it is greatly to be regretted that his outstanding ability and experience have been lost to the sugar industry and to the State.

A comprehensive reorganisation of the Department of Agriculture was approved by Cabinet during the year, and is now being put into effect. The Bureau of Sugar Experiment Stations has been incorporated within the Division of Plant Industry, but remains under the direction of the Advisory Board as to policy. The writer has been appointed Assistant Under Secretary in addition to being Director of Sugar Experiment Stations, and will be assisted in administration by Mr. Behne, who becomes Assistant Director and Chief Mill Technologist, and Mr. R. W. Mungomery, who comes to head office as the officer in charge of the Division of Entomology and Pathology.

Mr. C. R. von Stieglitz (Chemist) has severed his association with the Bureau after 31 years' service, and has taken over the plant nutrition laboratory of the Department of Agriculture. New appointees are Mr. J. H. Nicklin (Engineer), who has had some years of experience at Pleystowe Mill, Mr. L. G. Vallance (Chemist), and Mr. W. J. S. Sloan (Agronomist).

Mr. J. L. Clayton (Mill Technologist) has returned from his secondment to the Flax Committee, but Mr. N. G. Cassidy (Analyst) resigned to accept a position at the Irrigation Research Station at Griffith, New South Wales. Scholarships in mill technology were awarded to two students in the School of Applied Science in the University of Queensland—namely, Messrs. C. B. Venton and L. R. Brain. They will take up duties at the end of 1945 and 1946 respectively. Several positions on the staff remain unfilled and are now receiving attention.

We are thankful to be able to record that all staff members who went on active service with the Army and Air Force are alive and well and we look forward to their safe return in the near future.

Three meetings of the Advisory Board were held during the year at Bundaberg (29th August, 1944), Brisbane (15th March, 1945), and Ayr (26th June, 1945). The Bundaberg meeting was held in association with a demonstration of cane-harvesting machinery which was attended by the Director-General of Agriculture. The Board has given particular consideration to the Bureau staff problems and also to the necessity for raising the standard of technical education available to the industry.

Reports from the officers in charge of the several sections of the Bureau follow this section, and set out in some detail the work carried out by the depleted staff during the year. Summarising, it may be said that all activities were much below normal, with the exception of the cane breeding programme, which was restored to normal.

Owing to the shortage of field men it was impracticable to plant and harvest many formal replicated trials, with the result that field testing of varieties consisted mainly of a considerable series of yield-observation trials. The number of promising locally-raised seedlings is increasing, and it is interesting to note that for the first time Queensland seedlings constitute the largest group when variety returns are dissected to show country of origin (see Table X.).

Clark's Seedling, or H.Q.426, remained the most widely planted local seedling, with 7.5 per cent. of the total, followed by Trojan (3.7 per cent.), Q.28 (2.5 per cent.), S.J.4 (2.3 per cent.), and Q.25 (2.1 per cent.). The variety Trojan has had a meteoric rise in the Herbert River district, whilst Q.28 is increasing at a spectacular (indeed over-rapid) rate at Mackay. Q.44 is also finding favour in current plantings in the far north of the State.

The considerable changes taking place in the varietal composition of the district crops are illustrated by the graphs reproduced in Figs. 2 and 3. The change effected in twelve years has been almost complete in the districts of Bundaberg and south (see Fig. 2), while more gradual but still considerable changes are characteristic of Mackay (see Fig. 3).

Generally speaking, the disease position was perhaps not quite as satisfactory as last year—at least, as far as the southern districts are concerned. There the depleted inspectional staff has in some cases not been able to hold Fiji and downy mildew diseases completely in check. Gumming disease, which was known with certainty on only one farm in the State, has staged a small outbreak in the northern end of the Mossman area—the last stronghold of the highly susceptible S.J.4; fortunately, a considerable range of resistant varieties is available.

Grub damage to cane was again accentuated by a reduced fumigation campaign, but damage was somewhat less than in the autumn of 1944. The prolonged wet season militated against successful fumigation but also kept damaged cane in fair condition. The receipt of new fumigants, withheld during the war, will permit the resumption of experimental work with a view to developing a suitable substitute for carbon-di-sulphide. Grasshopper plagues were again observed in the central districts, but infestations were not as intense as in the previous year.

The Division of Mill Technology was unable to render more than a general advisory service during the period under review, but accessions of staff during the coming year will permit the resumption of some of the normal activities.

The levy imposed for the financing of the Bureau was fixed at one-halfpenny per ton of cane crushed, the assessment being payable in equal proportions by both miller and grower. In order to meet anticipated increased commitments the levy for the 1945-46 season has been raised to three-farthings per ton of cane crushed. Receipts and disbursements for the period under review, and also the totals since the inception of the Sugar Fund in 1900, are set out in Appendix I.

As a matter of general interest, the derivation of the C.C.S. formula, on which the Queensland Central Sugar Cane Prices Board's system of cane payments is based, is set out in Appendix II.

Appendix I.

SUGAR FUND.

Established under "The Sugar Experiment Stations Acts, 1900 to 1941."

Statement of Receipts and Disbursements, from 1st July, 1944, to 30th June, 1945.

Receipts.	£	s.	d.	Disbursements.	£	s.	d.
To Balance ..	32,956	11	3	By Salaries ..	8,766	17	0
,, Assessments	9,164	7	6	,, Contingencies	4,980	0	10
,, Endowment	5,663	1	5	,, Bundaberg Contingencies	1,567	1	4
,, Bundaberg	1,050	18	7	,, Mackay Contingencies	1,854	6	6
,, Mackay ..	1,319	16	1	,, Meringa Contingencies	1,900	19	0
,, Meringa	695	13	3	,, Balance ..	31,832	13	6
,, Sundries ..	51	10	1				
	£50,901	18	2		£50,901	18	2

Statement of Receipts and Disbursements from Inception of Fund, 1st December, 1900, to 30th June, 1945.

Receipts.	£	s.	d.	Disbursements.	£	s.	d.
To Assessments ..	325,438	2	8	By Disbursements ..	602,709	13	7
,, Endowment	239,862	3	0	,, Balance ..	31,832	13	6
,, Sugar Experiment Stations ..	69,242	1	5				
	£634,542	7	1		£634,542	7	1

Appendix II.

C.C.S. Formula.

For the benefit of readers of this report we would point out that the measure of available sucrose in cane (so-called Commercial Cane Sugar or C.C.S.) is given by the equation :—

$$\text{C.C.S. in cane} = \text{Pol in cane} - \frac{\text{Soluble Impurities in Cane}}{2}$$

In practice per cent. C.C.S. is calculated by the empirical formula :—

$$\text{C.C.S.} = \frac{3P}{2}\left(1 - \frac{5 + F}{100}\right) - \frac{B}{2}\left(1 - \frac{3 + F}{100}\right)$$

where— P = pol in first expressed juice
B = brix in first expressed juice
F = fibre in cane.

DIVISION OF SOILS AND AGRICULTURE.

SUMMARY OF FIELD REPORTS.

Field advisory work and the carrying out of cultural and varietal experiments on land made available by growers was again severely curtailed by shortage of staff. However, with the return of Messrs. Humphry and Elliot from active service it was possible to give more attention to this important aspect of the Bureau's activities than was the case last year. The following resumé briefly summarises the activities and observations of the field officers during the year under review:—

Northern Districts.

In general, the weather conditions for the 1945 crop were good. An extended wet season, and the consequent waterlogging of badly drained soils, seriously affected some areas—particularly at Babinda. It also caused delay in planting and many growers were forced to plant during the winter months. Late supplies of fertilizer also added to difficulties.

As a preliminary to undergoing final yield tests on the Meringa Station, several plots of "A" and "B" seedlings were laid down on the major soil types of the Mulgrave area in order to observe their behaviour under varying soil conditions. Of these varieties A.224 was outstanding, while B.212 gave good results on the better class soils.

Four varietal trials were harvested on growers' properties. The results are as follows:—

VARIETAL TRIAL (Gordonvale) Plant Crop.

This trial was laid down as a randomised block with three replications on a grey schist soil. It was harvested in September at the age of thirteen months.

SUMMARY OF YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per Cent.
Comus	21·66	17·04
Cato	20·20	17·22
H.Q.426	17·83	19·12
Q.10	17·30	17·38
Q.13	16·93	18·18

Growth Notes.—The soil was very dry at planting although good rain occurred a week later. The whole plot started poorly and the growth was generally poor throughout the life of the crop.

Discussion.—No significant differences were obtained from the yield figures, and although Comus out-yielded all other varieties, this must be treated as a suggestion only.

VARIETAL TRIAL (Aloomba) Second Ratoon.

The second ratoon crop of a 5 x 5 Latin square varietal trial which was laid down in July, 1941, was harvested during the year. The crop was thirteen months old when cut.

SUMMARY OF YIELDS.

Variety.	Plant Crop.		First Ratoon.		Second Ratoon.	
	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per Cent.	Tons.	Per Cent.	Tons.	Per Cent.
Cato	36·08	14·20	20·91	16·88	22·29	17·58
Q.44	35·47	13·59	20·82	14·55	24·27	16·09
Comus	35·41	14·38	19·87	15·69	24·15	16·48
Q.10	30·99	13·96	15·12	16·81	20·36	16·71
Badila	25·78	14·88	15·58	16·84	19·19	17·89

Growth Notes.—The weather conditions were satisfactory throughout the growth of the second ratoons and this resulted in a heavier yield than was obtained for the previous crop.

Discussions.—

Plant crop—Cato, Q.44, and Comus all exceeded Q.10 and Badila at the 1 per cent. level. Q.10 exceeded Badila at the 1 per cent. level.

First ratoon—Cato, Q.44, and Comus all exceeded Badila and Q.10 at the 1 per cent. level.

Second ratoon—Q.44 and Comus significantly exceeded Q.10 and Badila (1 per cent. level) and Cato (5 per cent. level). Cato significantly exceeded Badila (1 per cent. level) and Q.10 (5 per cent. level).

VARIETAL TRIAL (Edmonton) Plant Crop.

A 5 x 3 randomised block varietal trial was harvested at the age of eleven months.

SUMMARY OF YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per Cent.
Comus	40·97	14·29
Q.44	36·61	11·77
Q.10	33·79	15·22
H.Q.426	33·5	16·59
Q.13	31·99	15·71

Growth Notes.—All canes started off well with the exception of Q.13, which germinated badly due to poor planting material. Good weather prevailed early in the spring and all varieties made satisfactory growth. Some grub damage occurred and in June the cane lodged badly, due to combined effect of grubs, wind, and heavy crop. Because of this, an early harvest was necessary.

Discussion.—No significant differences were obtained and the fact that Comus outyielded the other varieties may be treated as a suggestion only.

VARIETAL TRIAL (Mourilyan) Plant Crop.

The plant crop of this varietal trial was harvested at the age of twelve months. It was laid down as a 3 x 5 randomised block on a schist loam.

SUMMARY OF YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per Cent.
30 G.1250	37·19	13·95
Trojan	29·4	16·13
Badila	24·22	16·17

Growth Notes.—Growth was generally good throughout the life of the plot. Considerable losses occurred in Badila and Trojan due to top rot.

Discussion.—The yield of 30.G.1250 exceeded that of the other two varieties at the 1 per cent. level, whilst that of Trojan exceeded Badila at the 5 per cent. level.

Nine varietal trials were set out during the year, as well as a large number of propagation plots. Trial work with fertilizers has also been resumed and one fertilizer—lime experiment was laid down. A considerable amount of soil sampling was done in connection with the fertility survey of the Mourilyan area.

Central Districts.

The Mackay district, generally, suffered from very dry and unfavourable weather conditions during the year under review. The cane was immature at the commencement of the crushing season but later some very high C.C.S. values were reached. As many growers were short of labour, early planting was again common throughout the district.

It was possible to recommence experimental work dealing with the nutritional aspect of sugar-cane culture and a Latin Square trial was laid down in order to compare the effect of sulphate of ammonia versus nitrate of soda when used as a side dressing. Arrangements were also made to plant two 6 x 4 randomised lime-fertilizer trials on soils known to be acid. No varietal trials were planted but a large number of propagation plantings were made in all areas.

There was little change in cultural practices. Various types of cutter planters are now in use in all districts, the drop type planter having been generally discarded.

A general survey totalling some 5,800 acres was carried out in the Inkerman mill area for unapproved varieties and diseases. A few unapproved varieties were found but none had been planted extensively. It was observed that the crops on the Burdekin were generally good in spite of man-power and fertilizer shortages.

Southern Districts.

These districts experienced somewhat dry conditions throughout the greater part of the year 1944-45 and rainfalls were in general below average. Although the winter was not particularly severe, some frost damage occurred in young plant and backward crops in low-lying areas at Bundaberg. Cane which was further advanced and growing vigorously was slightly affected, but the growing points and buds were not damaged.

An acidity survey was carried out in the Isis district, and an area of approximately 2,700 acres was surveyed. The cane on much of this land was poor, especially on the slopes where hillside erosion had taken place. The acidity tests were carried out in the field with the use of colormetric field kits, the results being checked from time to time by electrometric methods in the Brisbane laboratory. It was found that many of the soils were considerably acid, and, in consequence, a lime requirement trial has been laid down in the district. Two smaller areas at Bundaberg were similarly investigated, but no extensive developments of soil acidity were found.

A fertility survey, similar to those carried out in the northern districts, was commenced on the red forest soils of the South Kalkie area. Field observations indicate that many crops in the survey area were suffering from a decline in soil fertility due to lack of potash; this is in complete conformity with the analysis which have been completed to date.

No varietal or fertility trials were harvested, but a large number of propagational plots were set out and the progress of the different varieties recorded. Frequent inspections were made in connection with disease eradication orders, whilst the allotment of sulphate of ammonia to irrigated areas also increased the number of farms visited during the year.

WORK OF THE BRISBANE LABORATORY.

Mr. C. R. von Stieglitz,* Chemist.

ANALYTICAL WORK.

The following is a summary of the routine analyses performed at the Brisbane Laboratory for the period 1st July, 1944, to 30th June, 1945:—

Soils	573
Waters	256
Muds	4
Limes	3
Molasses	2
Ashes	4
Miscellaneous	7
Total	849

Owing to the cessation of analytical work for the various services, it was possible during the past year to increase very considerably the amount of time devoted to soil investigational projects. In addition, some 250 waters were examined for the Bureau of Investigation, Department of Lands, to determine their suitability for irrigation. These waters were from the Lockyer district, where possible expansion of the areas under irrigation is being considered. The majority of the soil samples examined were associated with the various fertility surveys, the remainder being submitted by farmers who desired to keep a check on the fertility status of their fields so that they would be in a position to use their fertilizer rations to best advantage and to supplement them with the most useful sugar mill by-products when such were available.

INVESTIGATIONAL WORK.

Mr. N. G. Cassidy was able to continue his studies during the year on the physical structure of the soil, and an article entitled "Some Fundamental Relations between Soil Structure and Treatments" is now in the press.

In this investigation, soils representing major types from widely-separated districts were subjected to various kinds of physical treatments and also to partial sodium saturation, and the structure induced thereby examined. Attempts to assess the changes in structure were made by measuring the relative percolation rate, water holding capacity, total pore space, hardness of soil crust, and dispersion of silt and clay.

It was found that the percolation rate for certain soils was increased considerably by working at moistures slightly in excess of the moisture equivalent and that partial sodium saturation rendered some soils particularly sensitive to mishandling. It is believed that some of the methods used for examining soil structure will prove useful in the field as a means of evaluating soils whose field properties are unknown.

FERTILITY SURVEYS.

Further sampling and analytical work on the sandy soils in the Mourilyan area was continued in collaboration with Mr. Knust, Adviser in Sugar Cane Culture, and results very similar to the previous year obtained. The available phosphate figures, although low in a number of cases, are, as a generalisation, higher than was anticipated. Available potash is low, however, and the survey has shown that Sugar Bureau No. 2 Fertilizer Mixtures, which are well supplied with both phosphates and potash, are the most suitable ones for this soil type. The sampling of the area will be continued this year, which should complete all but a few blocks.

* Now Plant Nutrition Officer, Department of Agriculture and Stock.

Two additional fertility surveys were commenced this year—one in the Walkerston-Te Kowai area, Mackay, and one at South Kalkie, Bundaberg. The sampling of the soils for analysis in these areas was carried out by Messrs. Elliott and Humphry of the field instructional staff, both of whom were released from the Army during the year. The procedure followed in previous surveys was adhered to as regards sampling—i.e., all blocks carrying a crop of mature plant cane or from which a plant crop had recently been harvested were sampled. These surveys will run until all blocks in the area have been sampled. As the analyses are completed each farmer receives advice as to the level of plant nutrients in his soil and the correct fertilizer to apply. The first year's results from the South Kalkie area showed that many of these soils are in need of lime to correct excess acidity and that the replaceable potash had reached a very low figure. The phosphate content, however, had kept up fairly well for soils which usually respond to phosphate fertilization. The low potash figures have been caused by the complete absence, for several years, of mixed fertilizers containing potash, and shows the need for the use of general mixtures on this soil type.

Interesting results were obtained from the analysis of the Walkerston-Te Kowai soils. Included in this survey were rich alluvial soils near the river, originally scrub lands, some old alluvials usually of medium fertility, and also some poorer type forest soils. It is pleasing to note that very few of these soils are showing marked plant food deficiencies, despite the fact that fertilizers have been in short supply for some years. Many of the blocks sampled, however, were very acid according to pH measurements, and should respond appreciably to applications of lime. In order to test the reliability of advice re liming, based on pH measurements, several liming plus fertilizer trials have now been laid out in this area.

In addition to the abovementioned survey, a study is being made of the effect of filter mud applications on the fertility of a block of land in the Walkerston area. This block has received an application of filter mud at the rate of 50 tons per acre. Soil samples for analysis were taken before the application of the mud to the field and at monthly intervals since. Results to date show rises in both the available phosphoric acid and pH values. Sampling will continue until an estimate is formed of the possible benefits of such applications. Monthly soil samples for the analysis of pH and available phosphate and potash have also been taken at 0-10 inch and 10-20 inch depths from selected blocks in the Walkerston-Te Kowai and South Kalkie areas, with a view to studying the monthly changes of nutrients in these soils.

Studies of the monthly fluctuations in soils from other areas, which were started several years ago, seem to establish the fact that the replaceable potash figures vary to a much greater extent than do those for available phosphate and that in general the highest values for potash are to be found in the summer and the lowest in winter. The pH figures of water suspensions vary much more appreciably than those for KCl suspensions, and the degree of variation, as might be expected, is different for the various types analysed. It is hoped to publish detailed information on the subject of seasonal variations of plant food availability during the coming year.

FERTILIZER RATIONING.

A fair amount of the writer's time had still to be devoted to this work, although the system is now working satisfactorily. During the year it was possible to put out one general mixture for farmers, and three mixtures are planned for the 1945-46 fertilizer year—i.e., June to June.

NORTHERN SUGAR EXPERIMENT STATION, MERINGA.

Mr. R. W. Mungomery, Officer in Charge.

METEOROLOGICAL AND NOTES ON CROP GROWTH.

Conditions for the 1944-45 growing season commenced rather favourably with adequate soil moisture for the late-planted cane crops. However, continued showery weather with consequent low soil temperatures tended to offset this initial advantage, and germinations were, in consequence, somewhat slow.

With the rapid onset of spring, the temperature rise was appreciable and young crops, under the influence of this warmer weather, continued to make a vigorous response until October–November, when drier conditions with persistently high temperatures prevailed. Crops on the more friable and sandy soils barely held their own, but those on the clayey soils were not so badly affected during this adverse early summer period. Fortunately, there was a return to average growing conditions during December and early January. The wet season rains commenced about mid-January, and the combined heat and abundant moisture soon promoted vigorous growth. From then onwards until the winter months there was no lack of moisture—in fact, rains were at times so torrential that fields were often flooded for lengthy periods. These heavy March precipitations caused much waterlogging and imposed a handicap on most crops that were growing on clayey and badly drained soils; but, in general, conditions remained good for growth right into the winter months, although the 1945 early plantings were markedly curtailed.

White grub infestations, as well as being severe on nearby farms, had also to be contended with on the Experiment Station, where approximately 10 acres had to be fumigated. With only short periods of fine weather occurring between cyclonic disturbances this fumigation work in itself proved quite a problem, and on some fields the pests were not brought under control until April, by which time some damage had been inflicted on the root systems of certain varieties. However, in most cases this damage was not severe and no outright loss of cane resulted.

Possibly the chief factor limiting cane production on surrounding farms during the past year was the general decline in soil fertility, and it is now apparent that the full impact of fertilizer rationing made itself felt in the period under review. Seed of leguminous crops for rotation was likewise in short supply or difficult to obtain; whilst due to the impressment of tractors for important defence projects and man-power shortages in general, cultivation, both before and after planting, left much to be desired. Accordingly, many of these soils, already seriously depleted of their former fertility, cropped far below their previous level of productiveness (particularly in the case of ratoons), even though weather conditions undoubtedly were favourable throughout the greater part of the year.

Man-power shortage was acute on this Experiment Station until the end of 1944, when additions were made to the labouring staff, and these in turn eased the strain on the scientific staff which necessarily had endeavoured to carry on under adverse conditions.

The following are the rainfall records taken at the Northern Sugar Experiment Station over the past twenty years, whilst an abstract of meteorological observations for the period 1st July, 1944, to 30th June, 1945, is also supplied:—

Year.	Rainfall in Inches.	Year.	Rainfall in Inches.
1925	76·98	1936	88·81
1926	59·12	1937	46·33
1927	90·16	1938	55·86
1928	66·33	1939	118·08
1929	102·28	1940	84·58
1930	107·61	1941	84·65
1931	98·82	1942	60·14
1932	76·31	1943	47·31
1933	96·06	1944	60·73
1934	91·44	1945 (6 months) ..	105·66
1935	59·91	Average for 20 years	79·22

Abstract of Meteorological Observations made at the Sugar Experiment Station, Meringa, from 1st July, 1944, to 30th June, 1945.

Month.	Rainfall. (Inches.)	Number of Wet Days.	Shade Temperatures. Maximum. High.	Maximum. Low.	Maximum. Mean.	Minimum. High.	Minimum. Low.	Minimum. Mean.	Mean Diurnal Range.	Mean Temperature 9 a.m.	Mean Per cent. Relative Humidity 9 a.m.
1944.											
July	3·73	7	84·2	72·3	79·4	72·4	49·3	60·7	18·7	70·6	80
August	1·24	12	90·0	75·0	81·4	67·5	46·0	56·7	24·6	70·9	80
September	2·73	15	90·0	77·2	83·4	66·8	48·3	60·2	23·2	74·0	74
October	1·01	10	95·0	82·5	87·2	72·2	55·8	64·0	23·2	78·3	67
November	1·23	5	95·8	82·0	90·4	73·4	56·5	65·6	24·7	82·4	65
December	4·74	11	95·0	85·2	91·9	75·5	61·4	70·7	21·2	84·2	72
1945.											
January	21·57	19	97·0	82·0	89·7	77·0	65·0	71·8	17·8	82·9	78
February	26·04	17	95·6	79·5	89·7	75·9	69·0	72·7	16·9	81·2	84
March	47·60	23	96·0	77·2	86·6	76·2	63·1	72·2	14·4	79·5	84
April	4·85	17	90·0	80·3	84·5	74·5	51·9	66·5	17·8	76·5	81
May	4·51	12	86·5	75·2	81·5	70·2	42·1	60·7	20·9	72·0	80
June	1·09	11	84·5	73·8	81·1	69·1	46·0	60·5	21·3	70·6	86
Totals	120·34	159	..	..	..	..	..	..	..	..	..

GENERAL.

Following the incorporation in our routine of the practice of ratooning all original seedlings, both plant and first ratoon crops of original seedlings were for the first time available for selection this year. Ratoon seedlings displayed greater variability between individuals of the same family than was apparent in the plant crop; hence, the work of selecting was made somewhat easier in the ratoon crop.

In addition to the planting of varieties for maintaining suitable parent canes for the cross-pollination work, the following trials were harvested on this Experiment Station during the past year:—

OBSERVATIONAL VARIETAL TRIAL (Plant Crop).

This trial, a plant crop on Block A.1, was harvested in September, at the age of 12 months. It consisted of single plots of eighteen varieties, so arranged that each plot was in contact with a plot of a standard cane for comparison purposes.

Summary of Yields. (A.1.)

Variety.	Cane per Acre.	Nearest Q.13 Plot.	C.C.S. in Cane.	C.C.S. per Acre.
	Tons.	Tons.	Per Cent.	Tons.
B.229	23·2	20·9	16·4	3·80
B.230	16·9	15·3	13·3	2·25
B.233	15·4	20·6	17·5	2·69
B.235	17·1	18·1	14·2	2·43
B.254	24·9	21·3	15·5	3·86
B.294	21·6	15·3	13·4	2·89
B.298	21·1	20·3	14·0	2·95
B.301	13·1	15·3	16·8	2·20
B.306	26·2	20·6	16·5	4·32
B.307	21·6	18·8	17·0	3·67
B.321	22·6	21·3	15·9	3·59
B.331	24·6	22·3	16·2	3·98
B.332	17·7	18·1	17·0	3·01
B.338	16·9	18·8	16·7	2·82
Q.13 average of 4 plots ..	19·7	..	16·3	3·21

Field Treatment.—After harvesting the last ratoon crop of cane on this land in the spring of 1942, the block was ploughed and planted to Poona peas, a good crop of which was ploughed under in January, 1943. The area was then sown to *Crotalaria usaramoensis*, and a fair crop was ultimately turned under in April. Thereafter conditions were very dry and planting was delayed until mid-September. Meatworks fertilizer was applied in the drill at time of planting at the rate of 3 cwt. per acre.

Growth Notes.—Soon after planting very hot, dry conditions were encountered, and this adverse weather continued into December, when some of the hottest and driest weather ever experienced there severely affected the trial. However, relief came with the thunderstorm rains after Christmas, and further light falls in the New Year encouraged steady development of the young stools. Thereafter wet season rains caused the cane to make vigorous growth and induced late stooling, but with the sudden cessation of the monsoon growth came to a virtual standstill. It was not until the advent of winter rains that the sticks again began to lengthen, and fully 1 foot of cane was added during this latter period. With the exception of some varieties that arrowed profusely most of them were in vigorous growth by the time the trial was harvested in early September.

Discussion.—Several varieties outyielded the standard in the plant crop and the following are now being grown in quarantine prior to transference to other areas:—B.229, B.254, B.306, B.307, B.321, B.331, and B.338. The growth habits of a few of these varieties are not altogether satisfactory, and final selections will not be made until the harvesting of the ratoon crop.

OBSERVATIONAL VARIETAL TRIAL (First Ratoon Crop).

The first ratoon of the observational varietal trial on Block A.6 was harvested in August, 1944, at the age of 12 months. Sixteen varieties were compared with a standard cane, the trial being so designed that single plots of the varieties under trial were in contact with one plot of the standard.

SUMMARY OF YIELDS. (A.6.)

Variety.	Plant Crop.			First Ratoon Crop.			Total Two Crops.	
	Cane per Acre.	Nearest Q.13 Plot.	C.C.S. in Cane.	Cane per Acre.	Nearest Q.13 Plot.	C.C.S. in Cane.	Cane per Acre.	C.C.S. per Acre.
	Tons.	Tons.	Per Cent.	Tons.	Tons.	Per Cent.	Tons.	Tons.
B.205	35·9	36·2	14·1	27·3	18·4	14·3	63·2	8·97
B.206	33·6	39·7	18·0	12·9	20·8	16·3	46·5	8·15
B.210	35·0	36·2	15·8	19·8	18·4	16·7	54·8	8·84
B.212	29·9	41·6	19·0	15·4	21·0	19·1	45·3	8·62
B.224	35·8	39·6	17·4	23·4	19·9	17·2	59·2	10·25
B.232	33·6	32·7	15·1	24·4	16·0	14·8	58·0	8·68
B.246	38·1	39·6	13·6	16·1	19·9	13·6	54·2	7·37
B.248	40·3	43·5	13·7	16·2	21·3	15·4	61·6	8·01
B.258	48·5	37·9	12·0	26·5	19·1	13·4	75·0	9·37
B.282	30·0	34·2	15·5	14·2	17·2	16·6	44·2	8·01
B.283	24·4	43·5	18·8	13·1	21·3	18·1	37·5	6·96
B.287	32·6	39·7	17·8	14·5	20·8	17·4	47·1	8·33
B.292	25·4	43·5	14·6	16·9	21·3	15·5	42·3	6·33
B.302	30·5	39·7	15·3	15·7	20·8	16·1	46·2	7·19
B.304	31·4	35·8	17·9	13·1	18·5	18·0	44·5	7·98
B.323	36·0	41·6	16·8	21·4	21·0	17·8	58·4	9·13
Q.13 average of 4 plots	37·9	..	17·4	19·1	..	17·5	57·0	9·94

Field Treatment.—The trash from the plant crop was burnt towards the end of August, 1943, and the block was then disc harrowed, but it was not until early November that there was enough moisture to warrant ratooning with a grubber implement. Even then the soil broke up rather lumpy and had to be fined down later. Soon afterwards the block was treated with meatworks fertilizer at the rate of 3 cwt. per acre, followed at a month's interval with a top-dressing of sulphate of ammonia at the rate of 1½ cwt. per acre.

Growth Notes.—Except for the more vigorous and low quality canes, most varieties ratooned rather sparsely, and during the dry spring months they all showed evidence of the severe weather conditions they were experiencing. It was not until February, 1944, that the trial had recovered from its early setback and the majority of the varieties commenced to make good growth. However, the favourable growing weather was confined to the short monsoonal period, and the final crop yields were generally poor.

Discussion.—B.232 was deemed to be the only cane suitable for planting on poor land, and it was advanced to a Latin Square trial. However, its low quality and early arrowing will probably impose too serious a handicap on it. B.224, B.212, B.287, and B.302 were transferred to different farm trials and planted on better soil types. In no cases has it been possible to repeat the early performance of B.224, but, on the other hand, B.212, B.287, and B.302 produced good crops, and B.212 gives promise of being one of the highest quality early maturers ever bred on this Experiment Station.

VARIETAL TRIAL (Plant Crop).

A 5 x 5 Latin Square varietal trial was planted in September, 1943, on Block A.5, and harvested in August, 1944.

Field Treatment.—This block was one used previously for vegetable production, and unfortunately during this period couch grass became firmly established. Before it was brought back to cane production it was ploughed and planted to Crotalaria (*goreensis* and *usaramoensis*). The couch grass proved a serious competitor with the Crotalaria in their early stages of growth, and due to the meagre wet-season rains of 1943 only a light crop was produced. This was turned under in June, and in succeeding months the land was well cultivated, but dry conditions prevented the block from being planted until towards the end of September. The fertilizer used was Sugar Bureau No. 2 planting mixture, applied to the drills at the rate of 3 cwt. per acre.

SUMMARY OF YIELDS. (A.5.)

Variety.	Cane per Acre.	C.C.S. in Cane.	C.C.S. per Acre.
	Tons.	Per Cent.	Tons.
A.278	17·8	16·7	2·97
A.224	15·8	18·1	2·86
A.233	18·6	15·2	2·83
Q.13	16·0	17·5	2·80
P.O.J.2878 (standard)	20·2	16·1	3·25

Growth Notes.—Extremely hot and dry conditions during the spring and early summer period of 1943 imposed a severe handicap, and, in consequence, the young cane was poorly stooled and backward when the wet-season rains commenced. These rains were of short duration, but they were sufficient to induce good growth for a few months and to initiate some late stooling. Dry conditions during April and May, 1944, again affected the cane and at the same time the standard P.O.J. 2878 commenced to flag freely, to be followed later by the other varieties to a lesser extent. Winter rains promoted further growth in the non-arrowed sticks and some of these were growing vigorously when harvested towards the end of August.

Discussion.—The poor clayey soil type on which this trial was set out undoubtedly favoured the standard P.O.J.2878 in the first place, since the other varieties yield their best crops on medium to good soils. However, the adverse growing conditions, coupled with patchiness in soil fertility, produced widely divergent crop yields and the trial was not significant.

A.224, which germinates and ratoons well, appears to produce crops of high quality, and in plantings elsewhere it shows more than ordinary merit. As the land for this trial was considered to be rather poor, all three "A" varieties were planted out in small plots for further observation on different soil types in the Mulgrave area.

VARIETAL TRIAL (Second Ratoon Crop).

The second ratoon of the 5 x 5 Latin Square varietal trial on Block A.3 was harvested in August, 1944, at the age of eleven months.

SUMMARY OF YIELDS. (A.3.)

Variety.	Plant Crop.			First Ratoon Crop.			Second Ratoon Crop.		
	Cane per Acre.	C.C.S. in Cane.	C.C.S. per Acre.	Cane per Acre.	C.C.S. in Cane.	C.C.S. per Acre.	Cane per Acre.	C.C.S. in Cane.	C.C.S. per Acre.
	Tons.	Per Cent.	Tons.	Tons.	Per Cent.	Tons.	Tons.	Per Cent.	Tons.
Q.44	39·7	14·7	5·84	32·6	17·3	5·64	23·9	16·8	4·02
Comus	38·1	14·9	5·68	31·1	16·1	4·99	24·8	17·0	4·22
Cato	37·1	14·6	5·41	24·9	16·4	4·08	21·8	18·1	3·95
K.58	35·7	13·2	4·71	24·3	16·9	4·09	20·5	16·8	3·44
Q.10 (standard)	31·5	15·4	4·85	23·8	17·6	4·18	18·6	18·0	3·35

Field Treatment.—Ordinarily this trial would have terminated after the harvesting of the first ratoon crop, but owing to the disorganisation of our seedling raising routine, caused by the vegetable production campaign, the trial was allowed to proceed to the second ratoon crop.

After taking off the first ratoon crop towards the end of September, 1943, the trash was burnt, debris raked off, and the block was then grubbed, disced, and meatworks fertilizer was applied at the rate of 3 cwt. per acre. About a month later this was supplemented by an application of sulphate of ammonia at the rate of 1½ cwt. per acre.

Growth Notes.—The ratoons came away uniformly and grew well despite the adverse weather, and they did not suffer from the hot droughty conditions to the same extent as did some of the plant crops nearby. Stooling on the whole, however, was sparser than in the previous crop. With the commencement of the wet-season rains Q.44 and Comus soon showed their superior vigour, and this was maintained as long as sufficient moisture was available. The growth rate eased during April and May, and in the latter month Q.44, Comus, and Q.10 began to show signs of arrowing, whilst both Cato and K.58 took advantage of the winter rains to make some late growth, thus making up some of the leeway.

Discussion.—The trial was harvested at the age of eleven months and the yields for a second ratoon crop grown under adverse weather conditions and without optimum fertilizer applications must be considered highly satisfactory.

Statistical analysis on the yield of cane per acre shows that Comus exceeded K.58 and Q.10 at the 1 per cent. level of significance, and Cato at the 5 per cent. level. Q.44 exceeded K.58 and Q.10 at the 1 per cent. level, and Cato exceeded Q.10 at the 5 per cent. level.

The potential yield of these new varieties is such as to equal or surpass some of the disease susceptible varieties which they replaced. They have now been widely propagated in certain mill areas.

LABORATORY WORK.

The following is a summary of the analyses carried out during the year:—

Cane (maturity tests and Experiment Station samples)	240
Cane (Farm trials)	129
Cane (Grower's samples)	12
Soil (Lime tests)	14
Total	395

CROP SUMMARY.

	Tons.
Cane sent to mill	369·3
Cane used for plants, samples, &c.	16·9
Total	386·2

Total area harvested	17 acres
Tons per acre harvested	22·7 tons
Class of cane—	Per Cent.
Plant cane	66·7
Ratoon cane	33·3

CENTRAL SUGAR EXPERIMENT STATION, MACKAY.

MR. D. L. MCBRYDE, Chemist in Charge.

METEOROLOGICAL AND CROP GROWTH REPORTS.

The greater part of the Mackay district (i.e., the main areas of the Pioneer River Valley, from Mirani to the coast and from the river as far south as the old Homebush area) experienced an extremely dry period extending from April, 1944, to February, 1945. The young cane suffered severely, and neither the plant nor ratoon crops were able to make normal growth during the spring and summer months. This dry period will also affect the crop for the 1946 harvest, since, owing to the serious shortage of suitable cane for plants, many farmers have been prevented from carrying out their usual proportion of early planting. Cane which was approaching maturity was not so seriously affected by the dry conditions, and reasonable growth was made throughout the mild winter. Crops were well forward at the commencement of the crushing season, and continued to ripen until, in September, the high peak of approximately 17 C.C.S. was reached.

The wet season opened in March, and by the end of the month most crops had assumed a more pleasing appearance. In consequence, therefore, it seemed likely that the yields would be satisfactory providing normal rains occurred during the next two or three months. Unfortunately, however, these expectations were not realised and the rainfall during April, May and June fell far short of requirements. Although a series of light showers were recorded, by the end of June it was evident that poor yields for the 1945 season must be anticipated.

There was a heavy emergence of grasshoppers during December and January, and there were indications that this pest would cause a considerable amount of damage. Fortunately, many of the swarms, some of which were of enormous proportions, died out before the insects reached their destructive stage. Consequently, damage to foliage was much lighter and confined to more restricted areas than was the case last year.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS MADE AT THE SUGAR EXPERIMENT STATION, MACKAY, FROM 1ST JULY, 1944, TO 30TH JUNE, 1945.

Month.	Rainfall. (Inches.)	Number of Wet Days.	Average Rainfall. (Inches.)	Shade Temperatures.					
				Maximum.			Minimum.		
				High.	Low.	Mean.	High.	Low.	Mean.
1944.									
July	0·80	11	1·35	82·0	71·0	75·0	67·5	37·0	51·9
August	0·77	5	1·02	88·5	69·0	76·6	62·5	42·0	49·9
September	0·48	9	1·64	90·0	76·0	79·9	63·0	48·5	56·9
October	0·23	7	1·67	92·5	78·5	82·7	68·5	49·0	59·1
November	0·92	6	3·09	94·0	80·5	87·7	75·5	56·0	64·5
December	2·11	9	6·89	97·5	80·5	90·9	75·5	59·0	70·6
1945.									
January	3·43	9	13·50	98·0	86·0	92·8	75·5	68·0	71·7
February	2·67	14	11·95	98·5	82·0	89·5	76·5	67·5	72·1
March	14·74	17	10·66	91·5	80·0	85·0	76·0	64·0	70·7
April	1·99	18	5·46	87·0	76·5	80·8	72·5	49·5	64·5
May	2·41	13	3·17	85·0	75·5	78·2	66·5	42·0	57·8
June	2·90	17	2·62	84·0	72·0	76·4	67·0	43·5	57·2
Totals	32·65	135	63·11	..	..	..	..	..	..

ANNUAL RAINFALL SINCE 1920 AT THE SUGAR EXPERIMENT STATION, MACKAY.

Year.	Rainfall in Inches.	Year.	Rainfall in Inches.
1920	57·27	1934	37·57
1921	95·89	1935	45·15
1922	34·47	1936	97·37
1923	25·23	1937	56·60
1924	53·37	1938	52·18
1925	54·80	1939	56·14
1926	34·60	1940	84·97
1927	83·87	1941	71·38
1928	72·28	1942	77·92
1929	64·03	1943	60·11
1930	55·81	1944	53·16
1931	30·01	1945 (6 months) ..	28·14
1932	48·48	Average 25 years ..	58·98
1933	71·94		

GENERAL.

During the year the following varietal and fertilizer trials were harvested:—

VARIETAL TRIAL (Plant Crop).

In September the plant crop of a 5 x 5 Latin Square trial on Block A.5 was harvested at the age of 12½ months. All plots received meatworks fertilizer at the rate of two bags per acre in the drill at time of planting, and also muriate of potash (45 lb. per acre) and nitrate of soda (1 cwt. per acre), applied as a top-dressing in January.

SUMMARY OF YIELDS. (A.5.)

Variety.	Cane per Acre.	C.C.S. in Cane (Per Cent.).		
		20–6–44.	8–8–44.	26–9–45.
	Tons.			
A.124	20·8	15·4	16·4	17·5
A.130	26·9	13·8	16·2	17·5
A.146	23·3	14·6	16·1	17·2
A.147	23·6	14·1	16·5	17·6
Q.28	25·4	15·4	16·8	17·4

Growth Notes.—The cane grew rapidly throughout the wet season and was not troubled by grass or weed growth. Fairly good growth was maintained in the autumn and also through the following dry period until harvesting.

Discussion of Results.—The yield figures of A.130 were significantly greater than those of A.147, A.146, and A.124 at the 1 per cent. level, but were not significantly greater than that of Q.28. The yield from Q.28 was significantly greater than that of A.124 (1 per cent. level), but was not significantly greater than those of A.147 and A.146. These latter two yields were both significantly greater than that of A.124 (5 per cent. level).

The trial will now be ratooned and the results of both crops considered before a decision regarding the value of the different varieties is arrived at.

VARIETAL TRIAL (Plant Crop).

This trial, which was harvested in August, was laid out on Block A.2 in the form of a randomised block consisting of five varieties with three replicates of each. It received meatworks fertilizer at the rate of 2 cwt. per acre in the drills at planting and was given a top-dressing of muriate of potash (45 lb. per acre) and nitrate of soda (1 cwt. per acre) when the cane had stooled.

SUMMARY OF YIELDS. (A.2.)

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per Cent.
Co.290	39·8	14·2
Q.28	41·5	16·2
Q.45	38·8	15·2
P.O.J.2878	36·8	15·8
Q.813	24·0	15·3

Growth Notes.—The soil was moist and well prepared when the cane was planted in July, 1943. The following spring, however, was dry and the field had to be irrigated to maintain satisfactory growth. As a result good growth was made, but the loss of cover due to grasshopper attack allowed a considerable amount of grass and weed growth to occur. However, none of the varieties suffered any serious interference and fair growth was made until harvesting.

Discussion of Results.—The yield of Q.813 was significantly exceeded by all the other varieties at the 1 per cent. level. The yield of Q.28 also exceeded that of P.O.J.2878 at the 5 per cent. level. There were no other significant differences.

VARIETAL TRIAL (First Ratoon).

This trial, a 5 x 5 Latin Square, was carried out on Block A.4. The cane, which was planted in August, 1942, was harvested as a plant crop in September, 1943, and first ratoon in September, 1944. The fertilizer applied to the ratoon crop consisted of two bags of meatworks per acre at time of ratooning, followed by 45 lb. muriate of potash per acre and 1 cwt. of nitrate of soda per acre, applied later as a side-dressing.

SUMMARY OF YIELDS. (A.4.)

Variety.	Plant Crop.		First Ratoon Crop.		Total Two Crops.
	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.
	Tons.	Per Cent.	Tons.	Per Cent.	Tons.
I.15	12·6	15·7	24·7	17·6	37·3
I.21	16·0	16·0	24·2	17·4	40·2
I.26	23·3	16·3	29·3	18·5	52·6
H.45	15·6	15·5	21·0	17·5	36·6
Q.813	14·1	16·3	11·8	16·4	25·9

Growth Notes.—The trial was ratooned under rather dry and hard soil conditions. All varieties came away well and the growth was fair. All but the standard Q.813 competed well with the wet season weed growth and gave better crops than were obtained from the plant crop.

Discussion of Results.—In both plant and first ratoon crops the yield from I.26 (now designated Q.50) was superior to that of all the other varieties. This yield increase was highly significant (1 per cent. level). Q.50 has now proved itself to be worth extensive field trial, arrangements for which are now in hand.

OBSERVATIONAL VARIETAL TRIAL (First Ratoon Crop).

The first ratoon observational varietal trial on Block A.4 was harvested in September, 1944, at the age of 10½ months. In this trial the performance of 16 varieties was compared with that of the standard cane Q.813. The experiment was so arranged that a single plot of each variety under trial was in contact with a plot of the standard. All plots were fertilized with meatworks fertilizer (two bags per acre) at the time of ratooning, and 45 lb. muriate of potash and 1 cwt. of nitrate of soda per acre were applied later as a top-dressing.

SUMMARY OF YIELDS. (A.4.)

Variety.	Plant.			First Ratoon.		
	Cane per Acre.	Nearest Q.813 Plot.	C.C.S. in Cane.	Cane per Acre.	Nearest Q.813 Plot.	C.C.S. in Cane.
	Tons.	Tons.	Per Cent.	Tons.	Tons.	Per Cent.
B.118	9·0	8·5	14·0	18·0	15·0	..
B.120	11·0	13·1	12·5	21·8	12·0	..
B.137	17·8	9·8	15·9	30·0	17·8	..
B.138	12·0	10·9	14·6	36·3	17·8	..
B.141	7·3	17·3	14·9	16·3	15·3	..
B.153	5·8	10·2	14·0	25·0	15·0	..
B.154	7·3	17·3	14·6	16·5	15·3	..
B.156	5·8	8·5	14·5	30·5	15·0	..
B.158	13·3	10·9	12·8	29·8	14·0	..
B.160	16·3	12·0	15·9	27·0	14·0	18·1
B.164	13·8	13·5	13·5	23·3	15·3	..
B.169	26·3	9·0	12·9	32·0	12·0	..
B.172	17·8	10·2	14·4	20·3	14·0	17·5
B.173	16·0	8·5	14·9	32·3	15·0	17·1
B.174	25·5	9·8	15·0	24·3	17·8	17·4
B.175	10·3	17·3	16·6	17·8	15·3	..
Q.813 (average of 5 plots)	11·3	..	15·8	14·8	..	17·3

Growth Notes.—The crop made steady growth throughout the season, and in consequence the ratoon crop was much heavier than the plant cane. In general, there was little interference by grass and weed growth.

Discussion of Results.—B.160, B.172, B.173, and B.174 were selected as the most promising varieties and have been planted out in a Latin Square trial.

OBSERVATIONAL VARIETAL TRIAL (Plant Crop).

The plant crop of this trial was harvested in October, at the age of 13 months. The experiment which was carried out on Block A.5 was of single plot design, each variety being in contact with a plot of the standard cane, Q.28. The plot of Trojan and one plot of Q.28 were cut out for plants. Meatworks fertilizer at the rate of two bags per acre was placed in the drills at planting, followed by a top-dressing of muriate of potash (45 lb. per acre) and nitrate of soda (1 cwt. per acre) in January.

SUMMARY OF YIELDS. (A.5.)

Variety.	Cane per Acre.	C.C.S. in Cane.	
		20–6–45.	26–9–45.
	Tons.	Per Cent.	Per Cent.
C.103	17·4	15·2	..
C.104	23·5	14·6	17·4
C.114	20·3	12·8	17·6
C.120	19·5	11·0	15·9
C.138	20·9	12·4	17·6
C.140	18·6	13·9	17·0
C.150	19·5	14·5	17·7
C.161	12·2	12·1	17·3
C.171	26·7	12·3	17·6
32/3575	19·2	15·6	17·8
32/8560	15·1	15·6	17·7
Q.42	20·3	16·1	17·5
Q.44	18·8	12·9	17·5
Trojan	..	13·6	..
Q.28 (average of 6 plots)	25·0	15·1	16·9

Growth Notes.—The plot was clean and well cultivated prior to the commencement of the wet season, and although no further cultivation was carried out most of the varieties kept well ahead of weed and grass growth. Reasonable growth was maintained throughout and the varieties were all close to maturity when harvested.

Discussion of Results.—C.171, C.104, and Q.42 returned the highest yields per acre. All these varieties will now be ratooned and selections made at the completion of the next harvest.

FERTILIZER TRIAL (Fourth Ratoon Crop).

This trial was carried out on a fourth ratoon crop (Block B.3) and was harvested at the age of 10½ months. It was designed to test the relative merits of sulphate of ammonia and nitrate of soda when applied as a top-dressing to a ratoon crop. Sulphate of ammonia was applied at the rate of 300 lb. per acre, and nitrate of soda at 386 lb. per acre. These amounts, which were equivalent in nitrogen, were both applied in two equal dressings. Superphosphate and muriate of potash, at the rate of 300 lb. and 200 lb. per acre respectively, were placed in a furrow along the cane rows in order to ensure that P and K would not be limiting factors of growth.

SUMMARY OF YIELDS. (B.3.)

Nitrate of Soda.	Sulphate of Ammonia.
Tons per Acre.	Tons per Acre.
23·4	22·5
22·7	22·4
20·7	21·8
23·4	20·9
23·3	21·5
19·8	17·5
22·6	22·7
21·5	21·9
20·7	21·8
Mean 22·01	21·44

Growth Notes.—The growth was slow but steady. The cane became very weedy after being partially defoliated by hoppers in January–February, 1944.

Discussion of Results.—It was found that there was no difference in yield or growth due to treatment. Small mill tests indicate that there is no difference in C.C.S. of the cane due to treatment, the nitrate blocks testing 17.5 and the ammonia blocks 17.3.

LABORATORY WORK.

The following C.C.S. determinations were made at the Station during the year:—

Station samples	83
Farm trial samples	22
Farmers' samples	7
Show canes	49
Total	161

CROP RETURNS.

Total cane harvested	636·4 tons
Total area harvested	33·1 acres
Average tons per acre	19·2
Class of cane—	
Plant	284·3 tons
Average per acre	25·6 tons
Ratoon	352·1 tons
Average per acre	16·0 tons

SOUTHERN SUGAR EXPERIMENT STATION, BUNDABERG.

MR. N. J. KING, Chemist in Charge.

The winter of 1944 was comparatively mild, only one frost of any consequence being recorded. This frost gave some valuable information on varietal resistance, as the varieties Q.42 and C.P.29/116 had been distributed to the growers of the five mill areas the previous spring and had been widely planted. Q.42 confirmed its reputation of frost resistance and C.P.29/116 demonstrated that it was somewhat more resistant than P.O.J.2878 in so far as heart damage was concerned, but more susceptible as regards killing of the top eyes. A very dry harvesting season was experienced and this, following the early growing season of spring, 1943, resulted in high sugar contents in all crops. Bundaberg mills recorded record figures for average sugar content of cane. The dry weather, however, was very unfavourable to spring planting; July and August plantings were more successful than later ones, as some effective rain did fall in these months. Later, many bad strikes were experienced and the early growth was slow and erratic. In particular, the autumn plant cane suffered during these dry months, as it had a greater vegetative development when the soil moisture was depleted. Ratoons were slow in development also, and such cane as had to be stood over was soon showing death.

December, January, and February rain totalled only 16.27 inches and the distribution was uneven. However, the cane grew fairly well with the exception of the autumn plant, which, in many cases, appeared to have had too hard a gruelling to revive. After February the rainfall was too light to effect cane development and the canes suffered severely for three months until cooler atmospheric conditions ensued. The total rainfall for the crop year July, 1944, to June, 1945, was only 28 inches. In certain areas of the district the crop growth was also adversely affected by fertilizer shortage, particularly potash, and, as in the past two years, the too-long ratooning of crops as a result of labour difficulties is also having its effect.

Vegetable production on the Station has been entirely suspended and the seedling raising programme resumed in its entirety.

No new introduced varieties were established on the Station during the year, and no distributions were made to the growers in the year 1944-45. However, propagation plots of Q.48 and Q.49 were planted out extensively in all parts of the five mill areas in preparation for distribution in spring, 1945. In the Isis area, a distribution of Q.42 and C.P.29/116 was made to all growers who desired plants, and further propagation of Q.47, Q.48, Q.28, and Co.301 was arranged. The two first-named will be distributed in spring, 1945. A plot of Q.49 was planted in isolation outside the Isis area, from which supplies of this variety will be drawn for future propagation.

In Maryborough, Q.42 and C.P.29/116 were distributed during the year, and Q.28 was propagated to such extent that a distribution will be possible in spring, 1945.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS MADE AT THE SOUTHERN SUGAR EXPERIMENT STATION, BUNDABERG, FROM 1ST JULY, 1944, TO 30TH JUNE, 1945.

Month.	Rainfall. (inches).	Wet Days.	Shade Temperatures.						Mean Diurnal Range.
			Maximum.			Minimum.			
			High.	Low.	Mean.	High.	Low.	Mean.	
1944.									
July	2·20	8	77	65	71·2	65	35	50·5	20·7
August	1·68	3	81	68	73·5	59	40	49·9	23·6
September	0·70	2	82	72	77·5	62	49	54·6	22·9
October	0·90	4	86	73	80·9	67	47	56·8	24·1
November	1·42	3	90	79	84·6	73	53	66·5	18·1
December	5·20	5	92	73	85·6	74	57	69·1	16·5
1945.									
January	5·16	6	90	83	86·6	78	64	69·3	17·3
February	5·91	7	92	81	86·6	75	64	70·5	16·1
March	0·91	5	91	81	85·1	78	60	66·6	18·5
April	0·52	3	88	78	81·7	66	46	58·4	23·3
May	2·51	6	81	66	74·9	62	42	53·4	21·5
June	1·03	4	78	68	73·5	62	37	54·2	19·3

The following are the rainfall records taken at this Station since the Experiment Station began operations in 1914. To conform with the year covered by the report, the rainfalls are given for the growing season beginning in July and ending in June:—

Year.	Rainfall. (Inches.)	Year.	Rainfall. (Inches.)
1914–1915 ..	31·99	1930–1931 ..	47·19
1915–1916 ..	28·54	1931–1932 ..	22·88
1916–1917 ..	58·08	1932–1933 ..	36·81
1917–1918 ..	49·85	1933–1934 ..	71·45
1918–1919 ..	24·24	1934–1935 ..	40·01
1919–1920 ..	28·20	1935–1936 ..	44·24
1920–1921 ..	45·16	1936–1937 ..	31·65
1921–1922 ..	44·97	1937–1938 ..	44·40
1922–1923 ..	37·14	1938–1939 ..	41·01
1923–1924 ..	34·16	1939–1940 ..	41·69
1924–1925 ..	50·96	1940–1941 ..	43·26
1925–1926 ..	37·62	1941–1942 ..	33·52
1926–1927 ..	68·18	1942–1943 ..	40·75
1927–1928 ..	74·69	1943–1944 ..	45·22
1928–1929 ..	31·16	1944–1945 ..	28·14
1929–1930 ..	43·16		

WORK OF THE STATION.

The following trials were harvested during the year:—

OBSERVATIONAL VARIETAL TRIAL (Second Ratoon).

The second ratoon on this trial on Block A.3 was harvested at the age of twelve months. This experiment was so designed that the single plot of each variety under trial was in contact with a plot of the standard cane. All plots were fertilized with Sugar Bureau Mixture No. 3 and ammonium sulphate at the rates of four cwt. and one bag per acre respectively.

SUMMARY OF YIELDS. (A.3.)

Variety.	Standover Plant.		First Ratoon.		Second Ratoon.	
	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per Cent.	Tons.	Per Cent.	Tons.	Per Cent.
H.3	48·3	12·3	37·9	15·0	34·7	17·22
I.4	45·5	11·7	30·1	15·8	27·7	17·00
I.10	40·8	12·2	26·2	15·3	27·9	18·00
I.17	32·0	8·9	6·7	12·9	10·5	14·71
I.21 (Q.49) ..	51·8	12·6	38·2	..	42·8	17·79
I.65	37·4	12·1	31·9	14·1	27·5	14·40
Q.20	*20·4	13·6	*17·5	16·4	*21·8	17·11
Q. 25	36·1	12·2	27·2	15·8	21·7	18·90
Q.42	45·5	13·8	29·0	16·7	27·9	18·17
Co.290	17·7	10·3	25·5	13·8	21·2	15·27
C.P.29/116 ..	60·4	13·7	43·3	15·9	48·6	18·21
30S.N.673 (Atlas)..	39·9	12·9	27·1	16·7	23·9	18·32
P.O.J.2878 (4 plots)	36·2	13·0	26·6	16·0	23·05	17·68

* Mixture of Q.20 and P.O.J.2878 due to heavy supplying.

Growth Notes.—After ratooning all plots came away well. C.P.29/116 showed remarkable vigour and quickly established an early lead. The Q.49 was also ahead of most other varieties.

Discussion.—In the following table the complete yields of the most outstanding varieties are shown in comparison with the adjacent plot of the standard P.O.J.2878. The three new canes, C.P.29/116, Q.49, and Q.42, have produced remarkable crops throughout the period of this trial, which was conducted under normal dry farming conditions.

Variety.	Tonnage.				C.C.S.		
	Plant.	First Ratoon.	Second Ratoon.	Total.	Plant.	First Ratoon.	Second Ratoon.
Co.290	17·7	25·5	21·2	64·4	10·3	13·8	15·3
P.O.J.2878 ..	28·4	22·9	19·4	70·7	*	16·0	17·3
Q.42	45·5	29·0	27·9	102·4	13·8	16·7	18·2
P.O.J.2878 ..	29·8	22·3	19·9	72·0	*	16·0	17·55
Atlas	39·9	27·1	23·9	90·9	12·9	16·7	18·3
P.O.J.2878 ..	29·8	22·3	19·9	72·0	*	16·0	17·55
C.P.29/116 ..	60·4	43·3	48·6	152·3	13·7	15·9	18·2
P.O.J.2878 ..	38·4	26·3	22·7	87·4	*	16·2	17·95
Q.25	36·1	27·2	21·7	85·0	12·2	15·85	18·9
P.O.J.2878 ..	35·3	26·3	23·9	85·5	*	15·8	17·45
Q.49	51·8	38·2	42·8	132·8	12·6	..	17·8
P.O.J.2878 ..	45·7	30·8	25·0	101·5	*	16·4	18·3

* P.O.J.2878 averaged 13.0 C.C.S. in the plant crop.

OBSERVATIONAL VARIETAL TRIAL (Plant Crop)

This trial, in which single plots of the varieties under trial were compared with adjacent plots of a standard cane, was harvested on Block F. at the age of 13½ months. All plots were fertilized with three cwt. per acre of Sugar Bureau Mixture No. 3 and top-dressed with one bag per acre of sulphate of ammonia.

SUMMARY OF YIELDS. (F.)

Variety.	Cane per Acre.
	Tons.
B.68	28·4
B.56	34·6
B.62	31·5
B.37	35·8
B.12	26·2
B.35	26·2
B.66	32·0
B.5	36·1
B.82	34·9
B.2	30·5
B.24	27·9
B.88	28·8
B.50	38·2
B.8	32·2
B.30	38·0
B.61	24·0
Q.42 (4 plots)	35·2

Growth Notes.—After planting, weather conditions were excellent for germination, but B.8, B.35, and B.61 gave indifferent strikes. B.50 gave a good strike, but was very slow. Early growth was good until the end of February. March rainfall was below average, and conditions remained rather dry until harvesting. B.8 showed much pokkah boeng during the wetter periods, while Q.42 had some mosaic, though no stunting was observed.

Discussion.—None of the yields were markedly superior to the standard cane Q.42. These varieties will now be ratooned and final selections made at a later date.

VARIETAL TRIAL (First Ratoon Crop).

The first ratoon of a 5 x 5 Latin Square varietal trial was harvested on Block A.1 at the age of twelve months. It was fertilized with Sugar Bureau No. 3 at the rate of four cwt. per acre and top-dressed with sulphate of ammonia (one bag per acre).

SUMMARY OF YIELDS. (A.1.)

Variety.	Plant Crop.		First Ratoon.	
	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per Cent.	Tons.	Per Cent.
Q.42	30·9	15·7	30·8	17·14
I.6	32·8	14·3	49·8	17·43
I.11	30·0	14·5	35·8	17·37
I.12	30·3	14·5	29·1	16·06
I.15	35·6	13·9	36·5	16·87

Growth Notes.—All plots ratooned well except for a few stools in Q.42, which failed to come away. I.6 grew well and covered in rapidly. Growth was generally good until early March, when dry conditions caused a check.

Discussion.—The yield of I.6 exceeded that of all other varieties at the one per cent. level. I.15 exceeded I.12 (one per cent. level) and Q.42 (five per cent. level), while I.11 exceeded Q.42 and I.12 (five per cent. level). It is unfortunate that I.6 is susceptible to Fiji disease.

FERTILITY ROTATIONAL TRIAL (Plant and First Ratoon Crops).

The plant and first ratoon crops were harvested from the second cycle of the long range rotational experiment on Block B.4. The plant crop of rotation 1 was harvested in September, 1944, at the age of 19 months, and the first ratoons of rotations 2 and 3 in October, 1944, at 12 months. The rotational treatments are as follows:—

Rotation No. 1.—Legumes grown for eighteen months, then plant cane and one ratoon crop.

Rotation No. 2.—Legumes grown for six months, then plant cane and two ratoon crops.

Rotation No. 3.—As for No. 2, but the cane variety changed in each rotation.

Each block is also further subdivided so that a long range potash trial could be superimposed as follows:—

0K—No potash.
1K—150 lb. per acre per annum, muriate of potash.
2K—300 lb. per acre per annum, muriate of potash.

In addition, all ratoons received uniform amounts of nitrogen and phosphate, while the plant crops received similar amounts of phosphate but no nitrogen.

SUMMARY OF YIELDS. (B.4.)

Potash Treatment.	Rotations (tons per Acre). 1 (Plant).	2 (First Ratoon).	3 (First Ratoon).	Mean.
0K	37·95	24·75	22·8	28·5
1K	45·95	32·6	26·9	35·15
2K	45·8	35·55	33·5	38·28
Mean	43·23	30·97	27·73	..

Growth Notes.—After harvesting in 1943, rotations 2 and 3 ratooned rather erratically, the Q.25 having some long gaps without cane. Growth was good from ratooning until February, 1944. The 1943 autumn plant cane on rotation 1 also progressed favourably although it had been frosted down in the winter of that year.

Discussion.—The addition of potash significantly increased yield, and field observations showed that at all times during the trial the growth of the 1K and 2K plots were superior to that of 0K. The difference between 1K and 2K was not quite significant. As would be expected, the 19 months old plant crop of rotation 1 gave a much higher yield than the 12 months first ratoons of rotations 2 and 3. However, all crops will be again ratooned before any direct comparisons of the effect of rotations are made.

QUALITY OF PLANTING MATERIAL TRIAL (First Ratoon).

The first ratoon crop of this trial on Block B.2 was harvested in August at the age of eleven months. The experiment, which was laid down as a 5 x 5 Latin Square, was designed to investigate the influence of the phosphate content of the planting material on germination and yield. All plots received a dressing of Sugar Bureau No. 3 Mixture at the rate of four cwt. per acre and sulphate of ammonia at the rate of one bag per acre. The treatments were as follows:—

A—phosphate rich plants; water soaked.
B—phosphate rich plants; top half only used.
C—phosphate rich plants; not soaked.
D—phosphate poor plants; soaked in 5 per cent. superphosphate solution.
E—phosphate poor plants; water soaked.

SUMMARY OF YIELDS (B.2.)

Treatment.	Plant Crop. Cane per Acre.	Plant Crop. C.C.S. in Cane.	First Ratoon. Cane per Acre.	First Ratoon. C.C.S. in Cane.
	Tons.	Per Cent.	Tons.	Per Cent.
A	19·6	14·6	17·1	13·9
B	18·2	14·5	16·3	14·5
C	19·4	14·5	17·2	14·5
D	43·3	16·2	28·7	15·2
E	42·6	16·1	28·1	14·8

Growth Notes.—All plots ratooned well and the same differences between treatments were soon apparent in the ratoon growth as in the plant crop. Growing conditions were good until February, 1944, after which dry conditions prevailed.

Discussion.—The yields from the phosphate poor plants were again markedly superior to that of all other treatments, and treatments D and E significantly exceeded treatments C, A, and B at the one per cent. level. However, as indicated in last year's report, this trial was unsatisfactory and the ratoon yields are no doubt mainly a reflection of the plant crop yields.

VARIETAL TRIAL (Plant Crop).

The plant crop of the 5 x 5 Latin Square varietal trial on Block D.2 was harvested at the age of fourteen months, All plots were fertilized with Sugar Bureau Mixture No. 3 at the rate of three cwt. per acre and one bag per acre of sulphate of ammonia as top-dressing.

SUMMARY OF YIELDS. D.2.)

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per Cent.
A.26	24·1	15·9
Co.290	22·0	16·1
A.16	21·7	15·7
32–8560	18·1	14·7
A.24	17·8	15·2

Growth Notes.—Good conditions after planting should have ensured an excellent strike, but this was upset by severe insect damage to plants on half the block, which had been previously planted to sudan grass. Growth was good until January, but declined after the February rains, since dry conditions were experienced from April until harvesting in October.

Discussion.—The yield of A.26 significantly exceeded that of 32-8560 and A.24 at the one per cent. level, and these latter two yields were also exceeded by those of Co.290 and A.16 at the five per cent. level.

FACTORIAL FERTILITY TRIAL (Second Ratoon).

The second ratoon of the second planting of this trial on Block B.1 was harvested during July and August at the age of nine months. The fertilizer treatments were as follows:—

0N—No nitrogen.
1N—120 lb. ammonium sulphate per acre.
2N—240 lb. ammonium sulphate per acre.
0P—No phosphate.
1P—400 lb. superphosphate per acre.
2P—800 lb. superphosphate per acre.
0K—No potash
1K—180 lb. muriate of potash per acre.
2K—360 lb. muriate of potash per acre.

SUMMARY OF YIELDS. (B.1.)

Treatment.	Plant Crop. Cane per Acre.	Plant Crop. C.C.S. in Cane.	First Ratoon. Cane per Acre.	First Ratoon. C.C.S. in Cane.	Second Ratoon. Cane per Acre.	Second Ratoon. C.C.S. in Cane.
	Tons.	Per Cent.	Tons.	Per Cent.	Tons.	Per Cent.
0N	22·2	13·4	24·1	15·3	13·1	13·7
1N	22·5	14·0	24·7	15·0	15·6	13·8
2N	23·8	13·2	27·6	14·9	18·9	13·7
0P	22·4	13·7	25·5	15·2	16·0	13·8
1P	22·3	13·5	24·4	15·1	16·3	13·8
2P	23·8	13·4	26·5	15·0	15·3	13·7
0K	19·6	13·3	19·8	14·8	12·0	13·5
1K	25·0	13·3	27·8	15·1	17·1	13·8
2K	24·0	13·9	28·8	15·3	18·5	13·9

Growth Notes.—The ratoons came away well, with a regular stand in all plots. Differences in growth due to variations in fertilizer treatment were quickly apparent, particularly in the case of the 0K and 0N plots.

Discussion.—In the second ratoon harvest the response to both nitrogen treatments—i.e., 1N and 2N—was significant, while in the first ratoon the heavier nitrogen treatment (2N) only gave a significant response. In the plant crop, which followed a legume cover, there was no significant response to nitrogen. Throughout the trial there was no response to phosphate.

As in the first ratoon there was a highly significant response to both levels of potash. In the second ratoon there was also a highly significant interaction between N and K, suggesting that for increasing K to be effective a sufficient quantity of N must also be supplied.

This trial was first planted in February, 1937, and after a plant and two ratoon crops were harvested it was replanted in January, 1941. The treatments and layout were identical throughout this period. The results have been highly instructive, and a brief summary may be shown as follows:—

—	Crop.	Treatment. Nitrogen.	Phosphate.	Potash.
First Cycle ..	Plant	No response	No response	No response
	First Ratoon ..	No response	No response	No response
	Second Ratoon	Response ..	No response	Response
	Green Manure.			
Second Cycle ..	Plant	Slight response	No response	Response
	First Ratoon ..	Response ..	No response	Response
	Second Ratoon	Response ..	No response	Response

FERTILIZER AND PLANT RESIDUE TRIAL (First Ratoon).

The first ratoon crop of this trial, which is laid out on Block E.4 was harvested in September at the age of 10½ months. The treatments are as follows:—

A—No trash; no green manure.
B—Green manure.
C—Trash and green manure.

These plots were subdivided and the following fertilizer treatments have been superimposed:—

NK, PK, NPK, Control—where
N = 225 lb. sulphate of ammonia per acre.
P = 200 lb. superphosphate per acre.
K = 200 lb. muriate of potash per acre.

SUMMARY OF YIELDS. (E.4.)

Treatment.	Fertilizer.									
	Plant Crop (Tons Cane per Acre).					First Ratoon (Tons Cane per Acre).				
	C	NK	PK	NPK	Mean.	C	NK	PK	NPK	Mean.
A	38·1	42·0	44·8	41·4	41·6	15·0	25·6	19·3	24·4	21·0
B	34·8	44·4	40·9	43·9	41·0	13·2	18·0	24·8	25·2	20·3
C	41·6	46·3	43·0	39·6	42·6	19·3	24·5	17·4	18·3	19·8

Growth Notes.—The cane ratooned rather poorly. Large irregular gaps were apparent, which were irrespective of treatment. Growth was rapid from November to February, but declined considerably in the following dry weather.

Discussion.—As in the case of the plant crop, there was again no significant differences due to treatments A, B, and C. For the subplot treatments, PK, NK, and NPK, all exceeded the control at the one per cent. level of significance, while NK, NPK exceeded PK at the five per cent. level. Where green manuring has been practised (B) the addition of PK gave nearly as good a yield as NPK. Apparently NK without green manure was a fairly satisfactory fertiliser for the soil under the conditions of the experiment, except where it followed green manure, in which case it would appear that there was an excess of N which required P to correct the NK balance. In view of the highly significant NK interaction revealed by the yield figures of the second ratoon crop of the factorial fertility trial on Block B.1, it is also possible that the balance could have been adjusted by the addition of more K. There is also evidence that trash has been of corrective value for an excess of N as shown by the highly significant difference between NK (A) and NK (B) being reduced to no significant difference between NK (A) and NK (C).

LABORATORY WORK.

Cane samples—	
Station	342
Farmers	73
Farmer's irrigation waters	26
Total	441

CROP SUMMARY.

	Tons.
Cane sent to mill	592·1
Sold for plants	1·0
Plants taken off station	2·95
Cane used for samples	3·0
Used for plants on station	6·0
Total	605·05
Acreage harvested	22·703 acres
Average tonnage per acre	26·6 tons

Cane sent to Mill consisted of following classes:—

	Tons.
Q.25	136·9
P.O.J.2878	172·4
P.O.J.2725	34·0
C.P.29/116	69·9
Q.42	17·9
Co.290	6·5
Seedlings	154·5
Total	592·1
Autumn plant cane	69·1
Spring plant	168·3
First ratoon	257·6
Second ratoon	63·1
Third ratoon	34·0
Total	592·1

REPORT OF THE COMMITTEE ON SEEDLING PROPAGATION.

By Mr. C. G. HUGHES, Pathologist.

The cross-pollination work was carried out as usual at the Northern Experiment Station, near Gordonvale. Although many of the late arrowers were not available in time to be of much use, a reasonably successful season was experienced. The varieties which normally arrow fairly profusely and early in the season behaved as expected, following the very heavy wet season. The later arrowers, however, were very disappointing, and, as so many commercial canes desirable as parents are included in this group, many requested combinations could not be made. Reference to the table, which gives critical rainfall and comments on arrowing for the years 1937-1945 inclusive, shows that the wet season this year was a very heavy one with a large number of wet days. It was confidently expected in view of our previous experience that the season in general would be very satisfactory, and it started that way; perhaps the falling off may have been due to the lack of sunlight as the days shortened and the showery weather continued.

RELATION OF ARROWING AT MERINGA TO WET SEASON CONDITIONS.

Year.	Rainfall.	Jan.	Feb.	Mar.	Apr.	Totals.	Arrowing.
1937	Rain in inches ..	8·4	4·7	16·4	4·9	32·4	Poor
	Wet days ..	18	15	20	6	59	
1938	Rain in inches ..	18·8	18·9	2·7	0·5	40·9	Poor
	Wet days ..	14	18	9	6	47	
1939	Rain in inches ..	26·1	36·9	34·7	9·3	107·0	Excellent
	Wet days ..	19	14	19	22	74	
1940	Rain in inches ..	12·7	18·9	34·4	7·3	73·3	Excellent
	Wet days ..	14	21	25	17	77	
1941	Rain in inches ..	12·2	24·2	15·4	18·7	70·5	Excellent
	Wet days ..	25	19	23	26	93	
1942	Rain in inches ..	3·2	12·0	3·8	8·4	27·4	Mediocre
	Wet days ..	11	20	13	19	63	
1943	Rain in inches ..	5·3	26·6	3·9	1·6	37·4	Excellent
	Wet days ..	14	24	14	14	66	
1944	Rain in inches ..	5·1	23·3	10·8	1·8	41·0	Poor
	Wet days ..	14	22	24	9	69	
1945	Rain in inches ..	21·6	26·0	47·6	4·9	100·1	See Text
	Wet days ..	19	17	23	17	76	

The actual crossing was carried out under flying scuds of rain with occasional very heavy falls. In the 60 days of the crossing period there were 30 wet days and over five inches of rain were recorded. Although creating a nuisance, the wet weather did not interfere with the carting of arrows and setting up of crosses and, except for two varieties, losses of arrows were not at all high. Crosses were made and the seeds ripened in the usual weak solution of sulphurous and phosphoric acids. Pollination was quite satisfactory and examination of arrows picked at random showed that seed had set. Nearly all the fuzz obtained was packed in airtight tins and stored in a cool atmosphere for use next year.

Completed crosses totalled 113, and are listed in Table VIII. Some of the seedlings featured are worthy of mention. The "C" canes are *robustum* hybrids; the "F's," Korpi x *robustum*, and B.317, a half *S. spontaneum* Tank seedling. 38-782 and 39-424 are seedlings from the U.S.A., with the cold-resistant *spontaneum* from Turkestan in their lineage. This is the first time we have been able to use these potentially valuable canes, as normally they do not arrow when any other canes are available.

As in past years, the foliage was lopped during the active growing period to delay arrowing in the free and early arrowing varieties. It proved very valuable with the varieties C.P.29/116, P.O.J.2364, and P.O.J.2725, and particularly so with the cold-resistant *spontaneum* seedlings mentioned above. These seedlings normally arrow in January in North Queensland, but by two severe loppings it was possible to obtain a few arrows at a time when arrows of a commercial cane, P.O.J.2725, were available.

All Stations germinated fuzz in 1944, using chiefly that stored from the 1943 crossing. There were considerable losses at Bundaberg, but at the other Stations, germinations of the 1943 fuzz were satisfactory.

At Meringa, 7,083 seedlings, representing 52 families, were planted out into the field in October, 1944. In addition, flats which had a large excess of seedlings were broken into sections and planted out in the mass. The seedlings were irrigated at planting and twice during the month following; thereafter the rainfall was adequate, sometimes even excessive, and a well-grown crop matured. The block was fumigated against grubs during the summer. Selections were made in June, but since this crop will be selected again in the ratoons next year only a few (actually 21) commercial selections were made; there were also seven breeding canes taken. The ratoons of the original seedlings sown in 1943 were also selected during June, 1945, and yielded 150 canes. All selections have been planted in 40-sett plots, except where the number of setts available was inadequate, or the canes were kept solely for breeding purposes.

At Mackay there were two sowings of fuzz in 1944: one at the end of February and the other at the usual time in June. All seedlings required could have been easily handled in the first batch, but since the summer sowing scheme had not been thoroughly proved the fuzz was sown in the two lots. Seedlings from the early batch reached the field during the third week in May and soon became well established. Although checked by the cool weather, they were not unduly affected by the winter weeds. The second batch was planted out into the field in October and brought the total to 7,189. Growing conditions were unsatisfactory, and drought and grubs combined resulted in a very poor crop. Selections were made in June, 1945 (when 87 canes were selected from 28 crosses), and planted in 40-sett plots. This year all seedlings were raised from the summer sowing, and 7,032 seedlings have been planted out for selection next year.

Bundaberg Experiment Station obtained only 2,179 seedlings from the 24 families of 1943 fuzz sown, and the 1944 stock had to be broached to the extent of 16 tins. These yielded 3,898 seedlings, making a total of 6,073 in the field.

The plant yield-observation trial at Meringa produced an excellent crop, and some of these "D" seedlings appear quite promising. At Mackay, a similar trial has suffered severely from the drought. At Bundaberg, the plant yield-observation trial included "D" seedlings, Trojan, Vesta, Akbar, Eros, Q.28. Q.44, and Q.45.

The ratoon yield-observation trial of "B" canes at Meringa has not yet been harvested, but B.321 and B.338 showed reasonably good sugar and a short, sturdy type of growth in the plant crop, and so were planted in farmers' plots for further observation. The ratoon trial at Mackay suffered severely from the drought, and growth was so poor that critical selection was impossible. The seedling B.30 (since renamed Q.52) was the most impressive in the yield-observation trial at Bundaberg, and was included in 1944 in a Latin Square trial.

The plant Latin Square trial at Meringa included B.232 with Trojan, Q.13, Q.44, and P.O.J.2878. A final decision regarding the seedling will not be made until next year. The plant trial at Mackay, in common with the rest of the Mackay Station, has suffered from the dry weather; it will be selected next year.

The ratoon Latin Square trial at Meringa containing A.224, A.233, A.278, Q.13, with P.O.J.2878, yielded poorly in the plant crop, and ratoons are not much more impressive. A.224 is the most impressive in outside plots, giving a good germination and early growth, and a high sugar content combined with early maturity; A.233 has rather a low sugar content, whilst A.278 has generally shown only mediocre vigour, particularly early in its growth. In the ratoon Latin Square trial at Mackay A.130 impressed most in the plant crop, and has yielded comparatively well in the ratoons; A.124 is the poorest of the four. In farm plots, A.130 and A.147 look impressive, but the other two seedlings will be discarded. The Latin Square trial planted at Bundaberg in 1943 gave results of no significance in the plant crop, due to attacks by wire worms causing the virtual failure of germination over a large part of the field. Results from the ratoons are not yet to hand.

Other trials completed on the Stations during the year under review included chiefly Latin Square ratoon crops. At Meringa, a second ratoon Latin Square trial showed over the three crops that Comus, Q.44, and Cato were better than Q.10. At Mackay, Q.50 significantly exceeded three other seedlings and the standard Q.813 at the 1 per cent. level; at Mackay, also, Q.28, Co.290, P.O.J.2878, and Q.45 all exceeded Q.813 at the 1 per cent. level; it was apparent that Q.28 with its vigour and erect growth is quite suitable as a standard cane on the station. A second ratoon yield observation trial was harvested at Bundaberg and showed excellent figures for some of the newer varieties; Q.42, over the three crops (one standover), yielded 142 per cent. on the P.O.J.2878, Q.49, 132 per cent., Atlas, 126, and C.P.29/116, 175, whilst Q.25 equalled the standard. The first ratoon Latin Square trial at Bundaberg, after showing only slight differences in the plant crop, in the ratoons showed Q.51 to exceed the other "I" seedlings and Q.42 at the 1 per cent. level.

Detailed results of the various trials of seedlings are to be found elsewhere in this Report.

Following are a few brief notes on some of the newer varieties:—

Northern Districts.

Q.44.—Has given particularly good results in the wetter soils at Mulgrave, although its growth has been very satisfactory on practically all types of poor to medium soils. It usually matures in the latter half of the season, but this year early harvested crops have compared favourably with the standard varieties. It is too vigorous a cane for planting on first-class lands. The variety also impresses at Innisfail, and plantings at Mossman and Babinda show that it is better than most varieties on the wetter soils.

Cato.—Has increased in area planted and is giving good results on medium soils. It does not appear to be suited to poor wet lands and first-class soil causes lodging. Sugar figures have been satisfactory.

Comus.—Appears to have a rather limited range. It does not ratoon well under adverse conditions, and tends to become pithy in dry weather, but many growers who have had success with Oramboo, Korpi, or Clark's Seedling in the past find Comus an excellent cane.

Trojan.—Has given good results in the far north on medium to good soils of fair moisture content. It matures late in the season, and germination and ratooning, although slow, are generally reliable.

Eros.—Has been proved susceptible to downy mildew and cannot be recommended where that disease is present.

32-8560.—In propagation plots at Innisfail and, with high early sugar, appears more promising than Eros.

Central Districts.

Q.28.—Is fast becoming the major variety in the Mackay district, and is suited to a wide range of soil types. It has done well on "glue-pot" country this year, and it has a remarkable ability to recover and produce a crop after a serious check.

Q.45.—Promises to be a useful cane on the better soils and in broken country and grub-infested areas. Sticks are heavy, although rather hard at ground level, and the variety stands well in heavy crops. Commercial results will decide its importance in comparison with P.O.J.2878.

Q.50.—A new release from the Mackay Experiment Station has so far proved itself a reliable striker and a better than average stooler with a satisfactory c.c.s. from mid-season onwards. The top is suitable for "chop," a characteristic which meets with general approval from cane growers, and the variety appears to be suitable for a wide range of soil types. It comes from the cross P.O.J.2725 x Co.290.

Comus.—Is definitely an unreliable ratooner, but some growers are preferring it to H.Q.426 as a cane to cut at the beginning of the crushing.

Southern Districts.

C.P.29-116.—Is enjoying great popularity in southern districts, due in no small measure to its excellent agricultural characteristics. It strikes well and grows rapidly to give a heavy crop, but the fact that it matures late in the season will probably prevent large plantings on individual farms.

Q.28.—Has impressed in plantings in the south, and will probably become an approved variety for Maryborough and Bauple areas in 1946. It has been found resistant to Fiji disease, but is sometimes affected with cold chlorosis.

Q.47, Q.48, and Q.49.—Have produced excellent crops on river flat farms, and show considerable promise. Q.47 and Q.49 give some promise as standover types, but Q.48 appears to be somewhat susceptible to red rot.

Two seedlings from the Bundaberg Experiment Station have, prior to distribution on farms, been named "Q" varieties. Q.51 is from the P.O.J.2725 x Co.290 cross and Q.52 from P.O.J.2875 x H.Q.409—the same parentage as that of Q.25—and both have impressed on trials on the station.

VARIETAL STATISTICS.

The varietal composition of the crop crushed in Queensland during the 1944 season is set out in Table IX. Every variety, of which 1,000 or more tons were crushed, has been listed with figures to the nearest 100 tons. The table is presented in the same form as in Reports of previous years, and includes figures for each of the four zones and the State as a whole. There are ten mills handling the crop north of Townsville, four in Giru and Burdekin, eight in the Proserpine and Mackay zone, and eleven in Bundaberg and south (where there are several very small mills). The only overlapping of zones occurs at Townsville, and Invicta (Giru) mill draws cane from both north and south of that city. The yield of cane for the State was approximately 1,000,000 tons more than in 1943, made up of a gain of 400,000 tons for north of Townsville, 140,000 for Giru and Burdekin, 370,000 for Proserpine-Mackay, and 87,000 for Bundaberg and south. Badila, with over 1,200,000 tons harvested is still easily the most important variety, although the percentage of the total is, at 28, lower than for many years; it has dropped considerably in percentage of the crop harvested in both the north of Townsville and the Giru and Burdekin regions. The next five varieties on the list—P.O.J.2878, Co. 290, M.1900S, H.Q.426, and E.K.28—maintain their relative positions, more or less, in comparison with 1943 figures, but the following show some very marked changes. Trojan, largely grown on the Herbert River, contributed 164,000 tons, and now occupies the seventh position; figures for 1943 crushing were only 17,000 tons, and it was well down the list. Present indications are that Trojan will feature even more prominently in the 1945 crushing. Q.28, the popular Mackay variety, jumped from a mere 2,400 tons in 1943 to 111,000 in 1944, and it will show a further marked increase this year. Q.25, although showing a substantial increase in tonnage, has not altered its relative position in the State total. Q.10 has declined somewhat in tonnage harvested, and is expected to be lower this season. Cato occupies much the same position as previously. Eros has increased from 5,400 tons to nearly 28,000; practically all of this is grown in the Herbert River district. Comus has increased about sevenfold in both the north of Townsville and Mackay zones. Q.44, with over 8,000 tons harvested, chiefly at Mulgrave, makes its first appearance on the list. Q.42 and C.P.29/116 are also newcomers.

Data concerning tonnages of varieties in Queensland have been published in these Reports for the last twelve years and during that time the varietal picture has changed considerably in the Mackay zone, and virtually completely in the Bundaberg and south. The percentages of each variety crushed

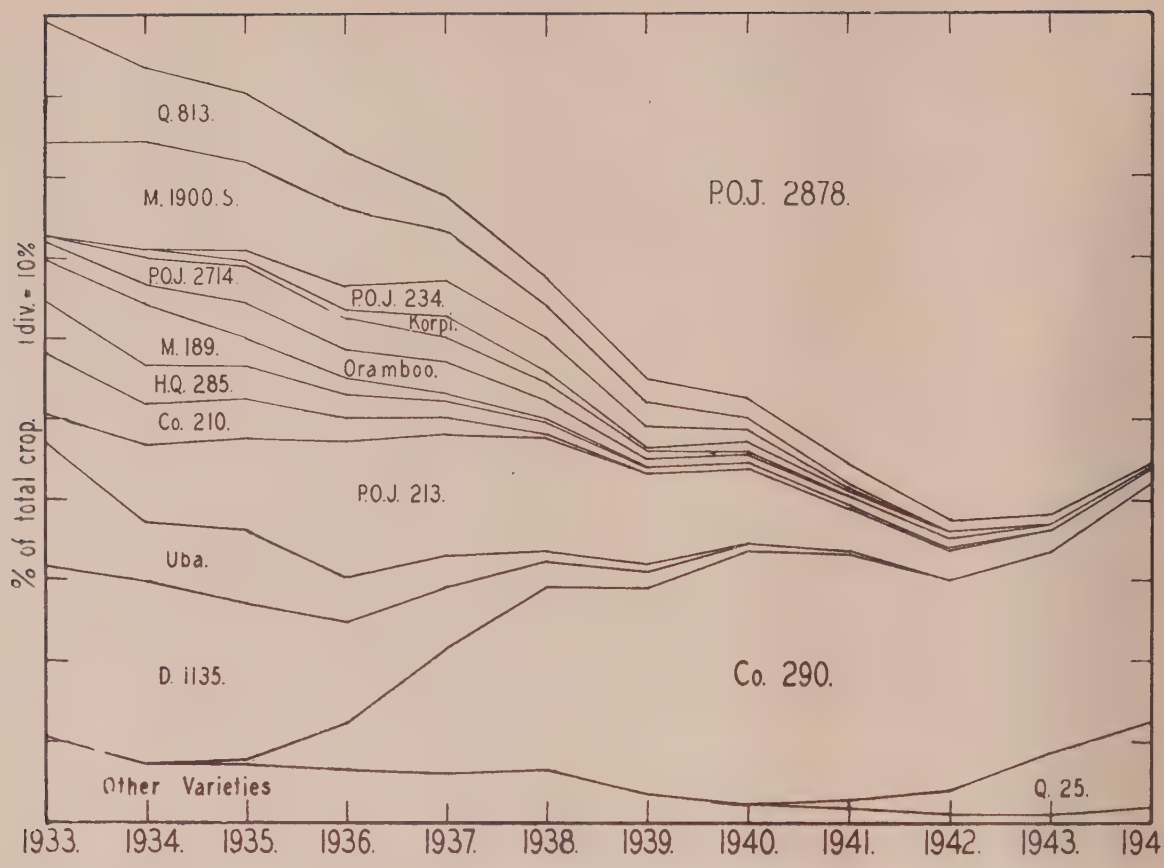

FIG. 2.—Graph illustrating the marked changes in percentage of varieties harvested in the districts of Bundaberg and south over the period 1933-1944.

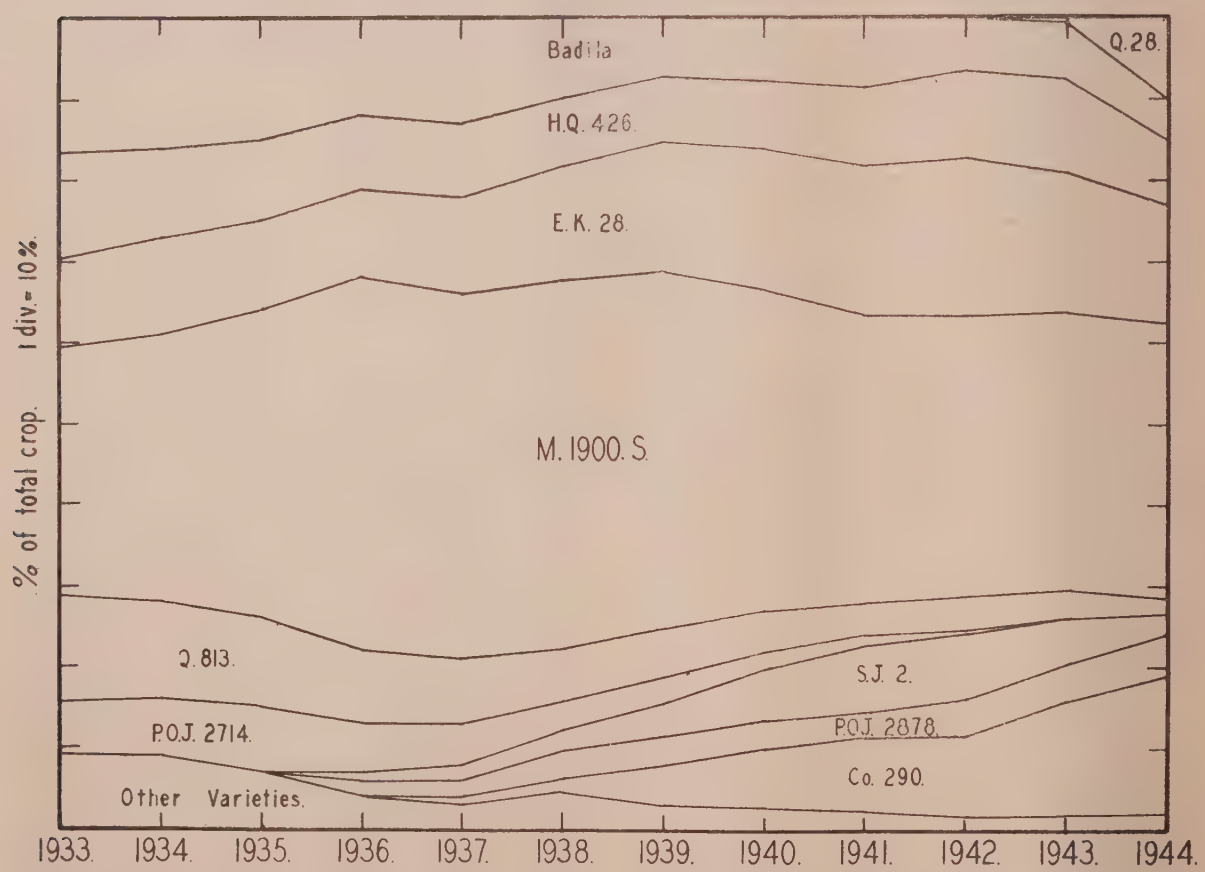

FIG. 3.—Graph illustrating the changes in percentage of varieties harvested in the Mackay district over the period 1933-1944.

during the years 1933-1944, inclusive, have been set out in two diagrams. That for Mackay (Fig. 2) shows that M.1900S., E.K.28, and H.Q.426 have maintained their importance and still comprise over 50 per cent. of the crop. Badila, Q.813, and the miscellany embraced in "other varieties" have shown a steady, continuous decline in popularity. P.O.J.2714 has disappeared, and S.J.2, after reaching a maximum of 7.8 per cent. in 1941-2, is fading. P.O.J.2878 has been checked by planting restrictions (owing to the presence of downy mildew), but it has maintained its percentage. The restrictions have now been lifted and a considerable increase may now be anticipated. Co.290, first appearing in 1936, has a steadily widening wedge on the diagram, and in 1944 yielded nearly 17 per cent. of the total. The abrupt rise of Q.28 from no record in 1942 to 10 per cent. in 1944 shows as a triangle in the top right-hand corner.

Figure 3, showing the varietal revolution in South Queensland, is even more spectacular. In the Annual Report for 1939 there was published a table showing the change in varieties from 1933 to 1938 inclusive. The change shown then was impressive, and demonstrated clearly the rise of the new canes and the decline of the old; the process has gone even further now. In 1933 there were nine varieties showing more than one per cent. each, and the total of all other varieties was about 12 per cent. In 1944 there were three main varieties, and all others together did not amount to five per cent. of the total. Varieties which formed nearly 100 per cent. in 1933 have faded to less than five in 1944. P.O.J.2878, just worthy of mention in 1933, now comprises 55 per cent. of the crop; Co.290, whose first appearance was in 1934, has risen to 29 per cent.; Q.25, the other important cane, shows an enlarging wedge on the diagram and now exceeds 10 per cent. of the crop. The tapering wedge of the old varieties and the enlarging wedges of the new show most effectively how the varietal position has changed in the last few years. The rise of the new varieties has meant the production of many hundreds of thousands more tons of cane when compared with the old, and has been a very important factor in stabilising the industry in South Queensland.

The rise of the new Queensland seedlings, such as Trojan, Q.28, and Q.25, is reflected in the figures shown in Table X in the analysis of tonnages crushed on the basis of country of origin of the varieties. Queensland has usually occupied a place behind New Guinea and Java as a source of varieties based on the tonnage crushed, but 1944 figures show it at the head of the list. Close behind is New Guinea, with 28.4 per cent.; Java has 22.2 per cent. and India just over 10. The United States of America, as the scource of C.P.29/116, is a new entry.

TABLE VIII.—CROSSES EFFECTED DURING THE 1945 CROSS-POLLINATION SEASON.

Female Parent.	Male Parent.
Akbar	Co.421
Badila	C.278, E.256, F.363, P.O.J.2878, Q.27
Co.270	K.95, Q.39, S.C.12/4
Co.281	C.P.29/116, P.O.J.2878, P.O.J.2940, Q.34, Q.39
D.225	Badila, K.95, Q.39
E.256	Q.27
Eros	Badila
F.201	Q.34
H.Q.426	Badila, C.278, F.363, Q.27
J.B.4	E.K.28, Q.31, Q.39
Jason	P.O.J.2940
K.49	B.317, J.B.3, Q.39
Korpi	Badila, C.278, C.P.29/116
Mahona	Badila, C.278, C.P.29/116, Co.290, F.361, P.O.J.2878, Q.39, Uba Marot
M.1900S.	P.O.J.2878
N.G.16	K.5
Pompey	C.277, Q.39
P.O.J.100	C.P.29/116, Q.33
P.O.J.2364	E.K.28, K.5, K.95
P.O.J.2725	B.317, Badila, Co.290, K.5, K.95, P.O.J.2878, Q.31, 38–782, 39–424
P.O.J.2875	Badila, C.P.29/116, Co.290, Comus, H.Q.409, Q.31, Q.34, Q.39
P.O.J.2878	Badila, Co.290, M.1900S
Q.10	Badila, C.278, C.P.29/116, Co.290, F.300, F.361, J.B.3, K.5, P.O.J.2878, P.O.J.2940, Uba Marot
Q.27	Badila, Comus, E.256
Q.37	Co.290, Q.33
Q.42	Atlas, B.254, C.P.29/116, Jason, P.O.J.2878, Uba Marot
Q.44	Badila, Comus, J.B.3, Oramboo, P.O.J.2878, P.O.J.2940
S.J.4	A.285, C.P.29/116, F.361, K.5, Q.39
Trojan	Badila, C.P.29/116, J.B.3, M.1900S, Q.31, Q.39
30S.N.874	Badila, J.B.3, M.1900S

TABLE IX.—VARIETAL COMPOSITION OF THE 1944 CANE CROP IN THE FOUR MAIN DISTRICTS, AND THE STATE AS A WHOLE. TONNAGES COMPUTED FROM MILL RETURNS TO NEAREST 100 TONS.

Variety.	North of Townsville.		Giru and Burdekin.		Proserpine and Mackay.		Bundaberg and South.		Whole State.	
	Tons.	Per Cent. Crop.	Tons.	Per Cent. Crop.	Tons.	Per Cent. Crop.	Tons.	Per Cent. Crop.	Tons.	Per Cent. Crop.
1. Badila	872,000	46·8	302,500	55·2	55,800	5·0	..	..	1,230,300	28·0
2. P.O.J.2878	101,300	5·4	100	..	56,000	5·0	485,200	55·3	642,500	14·6
3. Co.290	..	..	..	..	184,800	16·7	257,900	29·4	442,700	10·1
4. M.1900S	..	..	..	..	376,200	33·9	100	..	376,400	8·6
5. H.Q.426	215,400	11·6	26,200	4·8	87,800	7·9	..	..	329,400	7·5
6. E.K.28	..	..	132,900	24·3	162,200	14·6	..	..	295,100	6·7
7. Trojan	163,900	8·8	..	..	..	..	..	..	163,900	3·7
8. Q.28	..	..	..	..	111,000	10·0	..	..	111,000	2·5
9. S.J.4	93,100	5·0	6,900	1·2	..	..	..	..	100,000	2·3
10. S.J.2	12,600	·7	56,300	10·3	27,700	2·5	..	..	96,600	2·2
11. Q.25	..	..	400	·1	..	..	91,800	10·5	92,200	2·1
12. H.Q.409	83,000	4·4	..	..	..	..	..	..	83,000	1·9
13. Q.10	75,300	4·0	..	..	..	..	..	..	75,300	1·7
14. Cato	68,300	3·7	..	..	..	..	..	..	68,300	1·5
15. Pompey	45,500	2·4	..	..	..	..	..	..	45,500	1·0
16. Q.813	5,500	·3	..	..	23,100	2·1	5,500	·5	34,200	·8
17. Eros	27,800	1·5	..	..	..	..	..	..	27,800	·6
18. Comus	12,800	·7	200	..	9,200	·8	..	..	22,200	·5
19. Juno	21,900	1·2	..	..	..	..	..	..	21,900	·5
20. P.O.J.2725	3,400	·2	1,800	·3	5,700	·5	10,600	1·2	21,500	·5
21. Q.20	..	..	12,200	2·2	5,600	·5	..	..	17,800	·4
22. D.1135	13,400	·7	..	..	1,400	·1	..	..	14,800	·3
23. P.O.J.213	..	..	..	..	..	..	14,600	1·7	14,600	·3
24. Q.2	12,500	·7	..	..	..	..	..	..	12,500	·3
25. B.147	9,500	·5	..	..	..	..	..	..	9,500	·2
26. Q.44	8,300	·4	..	..	..	..	..	..	8,300	·2
27. Korpi	4,200	·2	2,350	·4	..	..	1,700	·2	8,200	·2
28. Oramboo	2,800	·2	..	..	2,000	·2	2,600	·3	7,400	·2
29. Brutus	5,100	·3	..	..	..	..	..	..	5,100	·1
30. S.J.16	..	..	3,800	·7	..	..	..	..	3,800	·1
31. Q.42	..	..	..	..	..	..	2,200	·2	2,200	..
32. C.P.29/116	..	..	..	..	..	..	1,900	·2	1,900	..
33. H.Q.285	..	..	..	..	1,500	·1	300	..	1,800	..
34. B.208	..	..	1,500	·3	..	..	..	..	1,500	..
35. Endor	1,200	·1	..	..	..	..	..	..	1,200	..
36. Mahona	..	..	..	..	..	..	1,100	·1	1,100	..
37. P.O.J.2714	..	..	1,000	·2	..	..	..	..	1,000	..
38. Saturn	1,000	·1	..	..	..	..	..	..	1,000	..
Others	2,200	·1	..	..	500	..	2,700	·3	5,400	·1
Actual Tons Harvested	1,862,196	..	548,156	..	1,110,481	..	878,272	..	4,399,105	..

TABLE X.—COMPOSITION OF THE 1943 CROP, ON THE BASIS OF COUNTRY OF ORIGIN OF VARIETIES.

Country of Origin.	Tonage Harvested.	Per Cent. of Crop.
Queensland	1,279,500	29·1
New Guinea	1,247,000	28·4
Java	974,700	22·2
India	442,700	10·1
Mauritius	376,400	8·6
Fiji	45,500	1·0
British West Indies	25,800	·6
United States of America	1,900	·05
Unclassified	5,400	·1

REPORT OF THE DIVISION OF ENTOMOLOGY AND PATHOLOGY.

Mr. R. W. Mungomery, Officer in Charge.

Although the staff difficulties of the pathology section of this Division were relieved by the return to duty of Mr. D. R. L. Steindl, and also by the appointment of Mr. W. D. Gibbons as cadet pathologist, officers of the Division had necessarily to undertake many duties usually performed by various officers still absent with the fighting forces. This naturally limited the time devoted to investigations on the more important pests and diseases, but the arrangement served to maintain the Bureau's essential field activities and enabled the full seedling raising programme to be pushed ahead practically unhindered.

Many of the Pest and Disease Control Boards continued to give valuable assistance in the planting of varietal trials, the establishment of isolation plots, and the distribution of new varieties, and due appreciation and thanks are extended to these Boards for their help during this awkward period. The excellent work done by the Boards, as a whole, during the pre-war and early war years is undoubtedly responsible for the present generally satisfactory disease position.

Northern Cane Beetle.

Fairly large flights of the greyback cane beetle (*Dermolepida albohirtum* Waterh.) occurred throughout the far north, mainly during October and early November in the areas of higher rainfall, and during December and January in the areas of lesser rainfall. In some districts the resulting grub populations were high, but in spite of this the actual damage was rather less severe than during the past several years. This was due to the abundant rain, which, although interfering seriously with fumigation, enabled the cane to regenerate its roots and also helped the remaining roots to supply the necessary moisture. The result was that much cane which would have been a total loss with a similar infestation in a normal season showed little more than a serious check in growth. This check naturally caused an appreciable decline in tonnage, but such losses were largely offset by an increased sucrose content early in the season. It was thus extremely difficult to make a reliable estimate of the loss in tonnage due to grubs, particularly as leaching of plant foods by the excessive rain also limited growth.

A conservative estimate of the area showing grub damage, from Tully north, is 4,000 acres. The area actually infested was much greater than this, but good growing conditions enabled many fields of cane which carried only light grub populations to escape visible damage. It is computed that a loss of some 32,000 tons of cane occurred.

In the far north, heavy and almost continuous rains restricted fumigation to well-drained fields. Lodging of cane prevented fumigation in fields which were sodden early in the season, and labour shortages were again serious. Approximately 900 acres were fumigated, this total being some 300 acres less than last year. Stocks of fumigant were quite adequate for the restricted campaign.

In the Mackay district, very light grub populations were apparent over an extensive area; although the droughty summer and autumn conditions tended to accentuate their destructive effects, some relief was provided by winter rains. In this district, too, it was difficult to assess losses due to grub damage, since in many cases the drought effect was disastrous. Very few heavy infestations were encountered and only 21 acres were fumigated. Beetle and grub collecting was carried out and approximately 80,000 lb. of beetles and 1,100 lb. of grubs were destroyed at a cost of about £2,250.

As a result of promising trials with the Blundell mechanically-operated fumigant injector during 1944, a unit was purchased for use on the Northern Sugar Experiment Station, both for commercial fumigation on the Station and for further experimental work. Unfortunately, the season was unsuitable for any type of soil fumigation and particularly for a horse-drawn injector. Due to excellent growing conditions during the spring and summer of 1944-45, crops were well advanced by the time a break occurred in the monsoonal rains; hence it was sometimes difficult to drive a horse or tractor through the cane. Wartime difficulties in manufacture and assembly resulted in late deliveries, and a number of machines developed minor defects for the same reasons. Nevertheless, several acres were successfully fumigated, and considering the exceptionally unfavourable conditions under which the machines first operated their performances must be regarded as promising. The experience of such a year as this emphasises the desirability of the rapid development of the mechanical type of injector so that large areas may be covered during the short periods in which the soil is in the correct condition for fumigation work. Several units have been sold to Cane Pest and Disease Control Boards and growers during the year, and it is expected that following the knowledge gained from the initial difficulties a definite advance in mechanical soil fumigation on a commercial scale will soon be evident.

The supply of new fumigants and poisons such as methallyl chloride, D.D.T., and Gammexane for trial against cane grubs and/or beetles did not materialise. In the meantime, however, further experiments were carried out on a small scale to observe the effects of injections of methallyl chloride on growing cane. Tests made late in the 1944 season indicated that this chemical had an unfavourable effect on the growth of cane when applied under dry conditions, but this year the fumigant was applied on a number of soil types in a normal fumigation period. Adequate rain fell after application and no check to cane growth was noted in any of these small scale tests.

In the Goondi area the fly parasites, which were reported during 1944 as killing large numbers of grubs, were again observed in most of the grub-affected areas, although not in large numbers. Their status would appear to have reverted to that predicted in last year's Annual Report—viz., that these flies provide an economic check to grubs only in years when climatic conditions favour their multiplication. Specimens which were sent to the Imperial Institute of Entomology were identified as *Prosena nigripes* Curr. (family Tachinidae, subfamily, Dexiinae).

Of the newer cane varieties in the far north, Q.44 appears to possess some measure of resistance to grub damage, whilst Cato and Q.13 are both somewhat susceptible. However, the extra cover and height of Q.44 attract the ovipositing beetles and the long heavy stalks tend to lever the stools out of the ground, so that frequently the cane suffers as badly as other varieties under the same conditions. It will usually be found, however, that the grub numbers beneath the Q.44 are greater than under the other canes.

Frenchi Beetle.

With the exception of some isolated localities, grubs of the Frenchi beetle (*Lepidiota Frenchi* Blkb.) caused rather less damage throughout the far north than for some years past. This was undoubtedly due to the fact that better rainfall during the spring and early summer of 1944 enabled the crops to keep growing in spite of Frenchi attack. Infestations by this species in the Mackay areas were apparently the most extensive for many years, and the damage was intensified by dry conditions during the spring-summer period; however, it is problematical whether some of these plantings would have produced millable crops even in the absence of grub attack. As is usual, a proportion of the damage occurred in fields which were also affected by greyback grubs, and, consequently, it was difficult to determine how much of the ultimate damage in these fields was due to Frenchi grubs and how much to greybacks. In all, several thousand tons of cane were destroyed by Frenchi grubs alone. This figure is small in comparison with the loss from the greyback grub, but it is sufficiently large to bring home to farmers the undesirability of the ploughout and replant routine, which allows the pest to breed uninterruptedly.

Childers Cane Grub.

The Childers cane grub (*Psuedoholophylla furfuracea* Burm.) was reported to have been responsible for an estimated loss of 15,000 tons of cane in the Isis district during the 1944 season. The replacement of the older, more susceptible varieties by P.O.J.2878 was followed by a period when undue cropping demands were made on the new variety, and questionable farming methods by some growers encouraged the development of huge grub populations with consequent damage to this normally resistant cane. It has been demonstrated that the high-speed rotary hoe, if used at the correct time, will do much to reduce grub populations to relatively harmless levels. This can be accomplished at a comparatively low cost as compared with the cost of soil fumigation, but wartime scarcities have made it virtually impossible to keep a sufficient number of these machines operating.

Following this high peak in grub activity in the Isis district, there was some agitation to reintroduce beetle collecting, but further light-trapping experiments sponsored by the local Cane Pest and Disease Control Board confirmed earlier investigations by Bureau officers that the number of female beetles attracted and captured at these light traps was so small as to render such a form of control worthless.

Beetle Borer.

Populations of the sugar cane beetle borer (*Rhabdoscelus obscura* Boisd.) remained at the comparatively low levels characteristic of the past few years. Under normal circumstances, with the heavy rainfall of 1945, the position regarding this pest would be expected to have deteriorated considerably. Canegrowers attribute this in no small measure to the giant toad, and there is no doubt that the pre-harvest burning of cane crops carried out during the war period has been an important factor in keeping the borer at its present low level.

Grasshoppers.

In the Mackay district, following the previous year's plague of the yellow-winged locust (*Gastrimargus musicus* Fabr.), hoppers commenced to emerge from over-wintering eggs in August, 1944. Hoppers hatching from August to October, although they fed in large numbers on the young cane, died before they were able to reproduce, but those that emerged during November and onwards came through success-

fully to flier swarms and were present as such in the cane fields in January, 1945. A further generation produced fliers in March-April, but the greater proportion of these died before ovipositing. Some were present in Mackay fields until mid-April, 1945, and some healthy eggs were still to be found when this report was written.

In general, the locust infestation of 1944-45 was not as intensive as during the previous year, and where reasonable growing conditions were experienced they did little damage to either the young or more advanced cane; in backward, drought-stricken crops it was virtually impossible to separate the damage due to these pests from the effect of poor growing conditions. The general eastward movement of the pest continued, and this season's heavy infestations commenced where those of the previous season terminated. Parts of the Farleigh mill area, the eastern portion of the Plane Creek area, and the Proserpine mill area were invaded for the first time.

Individual egg beds up to 10 acres in extent were observed on waste land and grazing properties both adjacent to and some distance away from the main canefields. Control of the pest in the young stages would therefore have presented great difficulties, and no district-wide control measures were instituted. Attempts at exterminating individual swarms were made with arsenical sprays, arsenic-bran baits, and burning, and 3 tons of poison baits were used with varying effect. As the hoppers increased in size they became more difficult to poison, and best results were then obtained when the poison baits were scattered very early in the morning, before the swarms commenced to move, or late in the afternoon.

Another Acridiid (*Austracris guttulosa* Walk.) which is usually present in the Mackay district throughout the year, was generally thought to have been more prevalent than usual during the past year, but no exceptional increase had occurred. This species no doubt attracted greater notice in view of the abnormal interest taken in *G. musicus* swarms during the last two years.

Eggs deposited in the Cairns district during February, 1944, by invading swarms of the yellow-winged locust hatched during late September-early October. The resultant bands of hoppers were kept under observation, and in some instances, where they appeared to offer a possible menace to canefields, were baited with the arsenic-bran mixture. Here, also, the baiting yielded variable results, and it is doubtful whether this form of control was warranted, since unbaited swarms caused negligible damage to crops, and all ultimately disappeared in the mountainous forest country west of the egg-beds. Later diggings showed that no eggs remained in the beds, nor were any eggs known to have been laid by fliers from this late spring hatching. Since there was no appearance of hoppers anywhere in the Cairns area during 1945 it can be presumed that normal spring and summer rains reduced the pest to its former minor status.

Only two species of parasites were bred from these locusts in the Cairns district, and they were identified by courtesy of the Director of the Imperial Institute of Entomology. One, a Calliphorid fly (*Blaesoxipha filipjevi* Rohd.), bred from the adult locusts, was a record for Australia, but there is a possibility that *B. gemina* Hardy is a synonym. The other parasite was bred from egg-pods and has been identified as *Anthomyia illocata* Walk. (Fam Muscidae) In addition to these parasites, large numbers of larval mites were observed infesting the adult locusts.

In the Mackay area, the Scelionid parasite (*Scelio leipartitus* Kief) was bred from egg-pods in March. It was again observed in the field from March to June, but this wasp was not considered to be a major factor in the reduction of pest populations. Two species of dipterous parasites were also bred from fliers and hoppers, but they likewise were of little consequence as control agents.

Wireworms.

Infestations by wireworms (*Lacon variabilis* Cand.) were not particularly bad during the year under review, although under the dry conditions operating in the central districts scattered populations were responsible for patchy strikes in odd instances.

Rats.

Nowhere throughout the sugar areas did rats assume plague proportions; in the drier areas their attacks were negligible, but the population increase in some of the wetter districts was considerable and difficult to control. Their rapid multiplication was no doubt aided by the protection afforded by the prolific growth of grasses and weeds developing during the prolonged wet season in North Queensland. Scarcity of fencing-wire prevented many growers from pasturing stock on gullies and waste lands and so destroying the sanctuaries of these rodents.

Three materials, "109," D.D.T., and zinc phosphide were tested as rat poisons, but their value was found to be inferior to the commonly-used phosphorus-mixture bait.

Gumming Disease.

At the end of June, 1945, the only known commercial field of cane in Queensland affected with gumming disease (*Bacterium vasculorum* Cobb, Grieg Smith) was a second ratoon crop of Badila in the Hambledon mill area, near Cairns. However, just as this report was in preparation, an outbreak of the disease was discovered at Mossman, the most northerly sugar area in Queensland. The origin of the outbreak is not known. Approximately 100 acres of cane are affected in a compact area of 400 acres of assigned land in the northern end of the Mossman mill area. Although some natural barriers and the favourable direction of the prevailing wind should retard the rate of spread into the main cane areas, it must be anticipated that such southward spread will take place. Without resistant varieties of proved worth the position would be serious, because gum-suspectible varieties comprised 80 per cent. of the cane crushed at the Mossman mill last year, and over three-quarters of this was the very susceptible S.J.4. Fortunately, however, some stocks of new resistant canes had been built up during the last few years, and by next season all farms in the diseased and immediately threatened areas will have sufficient plants of resistant varieties for their requirements. New varieties resistant to gumming disease are Q.44, Cato, Comus, and Trojan, whilst the older canes, Badila, P.O.J.2878, D.1135, and H.Q.409, are at least sufficiently so to be of use in combating the disease.

The gumming disease resistance trials at Brisbane included seedlings from all Experiment Stations, several *robustum* canes originally imported from New Guinea, C.P.29/116, Q.47, Q.49, and Q.52. The "Q" canes and C.P.29/116 showed themselves quite resistant to the disease. The New Guinea canes included were 28N.G.82, 201, 218, 253, and 289 and, apart from one stalk of 28N.G.218, no symptoms developed at any time. It is interesting to note that three seedlings from the Badila x 28N.G.251 cross, used as parent canes in the cross-pollination work, were also quite resistant.

Downy Mildew.

Downy mildew (*Sclerospora sacchari* T. Miy.) was not recorded from the Mulgrave and Hambledon areas for the second year in succession. In Mossman there was some spread following heavy flooding downstream from the fields known to be infected earlier in the season. A total of 32 acres was found diseased this year, involving six fields on three farms; varieties affected are S.J.4, Pompey, and Q.2. The Javan cane, P.O.J.2878, owing to its resistance to gumming disease, will probably be planted out somewhat more extensively in the near future in Mossman, and it is therefore unfortunate that it is susceptible to downy mildew.

In the Mackay district, all P.O.J.2878 and Co.290 was inspected in each locality where the disease was formerly present, but no downy mildew disease was found. Some 7,811 acres of cane on 759 farms were inspected during the year, and of this acreage P.O.J.2878 and Co.290 together comprised over 95 per cent.

The Bundaberg Cane Pest and Disease Control Board's inspection gangs recorded 1,327 stools of downy mildew in the district for the period under review. All except 28 stools (which were found in the South Kalkie area) were concentrated on a relatively few farms in the Barolin-Hummock road locality, and in Qunaba cane to the north of the Sandhills road. Orders for harvesting and ploughing out have been issued on the worst blocks.

Downy mildew disease resistance trials were concluded both in north and south Queensland. The northern trial, in isolation near Cairns, included many seedlings from Meringa and Mackay together with a number of standards. In assessing the results of downy mildew trials the percentage of stalks infected is recorded, since it is believed that under the conditions of the trial every shoot showing the disease has suffered a separate infection. Following are the results of the final stalk counts made in late June, 1945:—

No infection	C.114, C.150, D.114, D.206, D.233, D.244, D.269, D.277, D.286, China cow cane, 32–8560
1–5 per cent.	A.130, A.146, A.147, B.160, C.120, C.140, D.111, D.120, D.216, D.217, D.218, D.222, D.229, D.256, D.271, D.278, D.287, Badila. Cato, Co.290, Q.813, S. J.4
5–10 per cent.	B.174, D.204, D.221, D.225
10–15 per cent.	C.138, D.119, Akbar, D.1135, P.O.J.2727
15–20 per cent.	B.172, C.104, B.147, P.O.J.2878
Greater than 20 per cent.	A.124 (93), B.173 (63), C.161 (30), C.171 (38), D.112 (30), D.113 (27), D.115 (95), D.209 (49), D.241 (44), B.208 (62), D.166/34 (25), Eros (71), Neptune (78), Q.1098 (54), Trojan (21), Vesta (28)

Any cane more susceptible than P.O.J.2878 (in the 15-20 per cent. class above) cannot usually be grown in the presence of the disease with confidence; it is therefore disappointing to find that the new canes, Trojan and Eros, which have become very popular in the Herbert River district, are susceptible.

Results of the plant crop of the Bundaberg trial were published in this Report last year. The trial has since been

ratooned and stalk infection recorded in this crop is detailed below:—

No infection	I.11, I.15, Q.27, Q.28, Q.42, Q.47, Q.52, C. P.29/116.
1–5 per cent.	A.24, B.5, B.24, B.35, B.66, B.82, I.12, 29G.706, Q.13, Q.25, Q.45, Q.48, Q.49, Q.51. 32–8560, Co.290
5–10 per cent.	A.26, B.50, B.61, Akbar, Q.44, P.O.J.234
10–15 per cent.	A.16, B.12, B.56, B.88, Eros, Trojan
15–20 per cent.	B.8, B.38, B.62
Greater than 20 per cent.	B.2 (34), B.68 (40), Vesta (23), P.O.J. 2878 (21)

Infection in susceptible varieties was not as great in this trial as in the northern one, but even so it can be seen that two Bundaberg seedlings at least are too susceptible for further propagation.

A repeat of experiments carried out by the Bureau some years ago again demonstrated that downy mildew disease can be easily transmitted from cane to corn and *vice versa*, using P.O.J.2878 and the corn varieties Reid's Yellow Dent and Golden Beauty. Several varieties of cultivated sorghums, Sudan grass, and Johnson grass growing alongside the diseased corn and cane did not contract the disease.

Fiji Disease.

The inspecting gangs of the Bundaberg Cane Pest and Disease Control Board found 7,475 Fiji-diseased stools in the 15,183 acres inspected. Some 3,310 diseased stools were found in the quarantined Avondale area and 1,954 in the Tantitha area, leaving 2,211 distributed over the rest of the district. Although the disease occurred on several farms, and in two localities where it had not been seen before, the infection outside the quarantined area was generally fairly well scattered and there were no new foci of heavy infection.

In the Isis area only four stools affected with Fiji disease were found during the year. They all occurred in the one farm in a block of first ratoon P.O.J.2878.

In the Maryborough area this disease continues to occur in very small amounts over a widely scattered area. The localities where it was once serious have been cleaned, and in other places the disease appears to be coming under control, as evidenced by the fact that only 72 stools were located there during the year. The quarantine area proclaimed last year as a measure to control plantings of setts from diseased farms has been useful in keeping a check on the disease.

In the Moreton area the position in regard to Fiji disease is not reassuring. Nearly 11,000 diseased stools were rogued during the year, an increase of about 3,000 stools on the 1943-44 season. The position is not improved by the fact that many farms on the uplands, away from the diseased flats, have gone out of cane production, and so a valuable source of disease-free planting material has been lost. With the falling off in returns from the production of vegetables and other crops, which is bound to come in the near future, it is probable that many of these farmers will resume cane-growing, and this, in combination with the new, more resistant canes now being propogated, should lead to some improvement in the disease position.

The small Fiji disease resistance trial concluded in July, 1944, showed Q.44 to be resistant to the disease, whilst Q.52 and Eros are probably commercially so: Q.45 appears to have the same order of susceptibility as P.O.J.2878. The trial just finished consisted chiefly of seedlings from the Bundaberg Experiment Station, although there were also several named varieties. Q.47, Q.49, Toledo, and Trojan did not show any infection, whilst Q.52 had eight diseased stools in a total of 33; Loethers, four in 36; R.P.8, 13 in 35; whilst the standard P.O.J.2878 showed 22 diseased in 36.

In a test designed to discover whether Fiji disease could be controlled by hot water treatment of the setts, it was found that, up to the limits of treatment which could be endured by the buds, the disease was not controlled.

Leaf Scald.

Leaf scald disease (*Bacterium albilineans* Ashby) still occurs in small amounts in the far northern mill areas. In the Herbert River district, following a very dry spring, the disease became much more apparent, and many fields of standard varieties showed infection. There was a fairly widespread outbreak in the variety Trojan and some occurred in Eros, whilst on the Ingham Line section S.J.2 and the very susceptible Nanemo were severely affected. It is interesting to note that 32-8560, listed as resistant to leaf scald in Hawaii, showed an appreciable amount of disease in the propagation plots. Measures taken to control the disease included sterilization of cane knives and the introduction of clean seed. A survey made following the wet season showed that with the good growing conditions the amount of disease had fallen considerably.

Owing to labour difficulties there was no leaf scald resistance trial planted in 1944, but instead, plots of several new seedlings from the Northern Experiment Station were planted on a few farms in the Mulgrave mill area, where a good deal of leaf scald usually occurs. The plantings should give an indication of the resistance of the varieties under ordinary commercial conditions. A trial is being planted this season.

Mosaic.

Mosaic disease is still very rare in the far north; it is present in the Burdekin area, but the local Cane Pest and Disease Control Boards are taking active measures against it, and it should not assume serious proportions. In Mackay, field inspections were largely confined to varieties susceptible to downy mildew, and since these varieties are resistant to mosaic there were very few reports of the latter disease. However, the disease occurs on probably 50 per cent. of the farms in the district, although it is not serious in any locality. Mosaic is still present in the Bundaberg district; in the Maryborough area it has increased, owing chiefly to the planting of the variety Q.42, and the Island Plantation showed heavy infection. It appears that Q.42 is tolerant to mosaic and does not suffer any marked depression in growth rate through the presence of the virus.

Red Rot.

Red rot was reported from several parts of the Mackay district, but was not severe. It was prevalent in the Moreton area and many failures to ratoon in the later-cut blocks of Co.290 were probably due to this disease, occurring as it did during a period of very dry weather.

Chlorotic Streak.

Chlorotic streak still remains a problem in most of the northern mill areas and at Moreton in south Queensland. The insidious nature and the dearth of obvious symptoms tend to hide the seriousness of this disease from the average farmer, but the fact remains that practically all low-lying areas in the north are affected and tonnages harvested are at present much below what they should be.

The prolonged wet season this year has caused the disease to become obvious over a wider area than normally, and in some places (e.g., Mossman district) there is scarcely a field unaffected. The war interrupted several schemes for the bulk hot-water treatment of setts before planting, and it is to be hoped that they will be considered again in the near future.

Several attempts at transmission of chlorotic streak disease were made during the year using various methods of direct inoculation, but all were unsuccessful.

Miscellaneous.

Amongst the minor diseases reported during the year were banded sclerotial disease in Innisfail and sooty mould (associated with aphid attack) in the Bundaberg area. Leaf freckle was occasionally very obvious in Q.28 in the Mackay district.

A large part of the district about the Pioneer River at Mackay experienced very severe drought conditions during the spring and early summer, and many fields suffered heavily. In the case of the new variety Q.28, it was interesting to note that the damage sustained by different blocks of this cane sometimes varied with the source of the plants; in general, setts from a low badly-drained area gave rise to a much poorer crop in the ratoons than did setts from other sources. The problem is being investigated at the present time.

A specimen of cane killing weed, identified by the Government Botanist as *Striga curviflora*, was received from Booyal, near Childers. It was reported that, although the affected patches were not very large, there was considerable damage in the field.

In the past it has been the practice to take setts through the Brisbane quarantine house when transferring plants from one quarantine area to another. However, this year has seen the initiation of a system of district isolation plots whereby varieties can be transferred in greater quantities and canes new to a district are then available a year or too sooner. Since the canes are grown in isolated plots, should any disease show up the whole planting can be ploughed out without any risk of infecting the growing crops of the district. Plots have already been established in Moreton, Isis, Innisfail, and Cairns areas.

The legume culture service to cane farmers was continued, and during the year 127 farmers sowed 2,400 acres of treated legumes. Over 2,000 acres were of cowpeas of various types, approximately 300 acres were of Gambia pea, and the remaining 51 acres included lupins, clover, lucerne, and various beans. Several fresh strains of *Rhizobium* were isolated from various legume species, and in order to have available the most efficient strains some 15 isolates were tested. The medium used in this laboratory is that recommended by W. R. Carroll (Soil Science 37: 119, 1934), and whilst the growth of the rapid growers in satisfactory, there has always been some trouble with the more slowly growing organisms. During the course of the cultural work it was found that the growth of the different strains of *Rhizobium* is much improved by the addition of sodium nitrate (at the rate of 100 parts per million of nitrogen) and a trace of ferric phosphate to the standard medium.

The only scientific publication during the year was a paper on Rats by Mr. W. A. McDougall. This appeared in "The Queensland Journal of Agricultural Science," Vol. 1, No. 3, September, 1944, under the title "An Investigation of the Rat Pest Problem in Queensland Canefields: 3. Laboratory Experiments on Food Intake and Toxicity."

DIVISION OF MILL TECHNOLOGY.

Mr. E. R. Behne, Assistant Director, and Chief Mill Technologist.

Staff.

Some changes have occurred in the staff of the Division during the year, as outlined elsewhere. Following the reorganisation of the Department of Agriculture and Stock, positions have been reclassified and new appointments made. The writer was appointed Assistant Director and Chief Mill Technologist, whilst Mr. Clayton's title is now Mill Technologist. Mr. Home, who previously was Laboratory Assistant, is now Assistant Analyst, and has been attached to the Division of Soils and Agriculture. Mr. J. H. Nicklin has been appointed Engineer, and two scholarships in Applied Science have been awarded to students at the University. Vacancies exist for three Assistant Technologists and an Assistant Engineer, and attempts will be made in the near future to fill these.

Mutual Control.

As in 1942 and 1943, limitations of staff prevented the Mutual Control being fully operated, and a Synopsis only has been prepared. The same twenty-four mills contributed as previously.

Standardisation of Apparatus.

Again work in this direction was confined to units of apparatus essential for the analysis of juice for cane payment purposes. The results of testing were:—

Brix Spindles.—Of 207 spindles tested, 182 were of the required standard and received official certificates. Of the remaining 25 which received unofficial certicates, 17 spindles had merely unofficial ranges, one had a standard range but errors beyond the legal tolerance, whilst seven had both unofficial ranges and excessive errors.

Polariscope Tubes.—Three polariscope tubes were tested and found satisfactory.

Standard Cell.—One Western Cadmium cell was prepared and standardised for a mill.

Mill Work.

Of necessity this phase of the work of the Division was confined to mill visits. Special visits were paid to North Eton (the management of which requested advice on future developments) and to Mount Bauple for the purpose of assessing the value of the plant and equipment on behalf of the Treasury Department. A special report on the work of Mount Bauple mill was also prepared at the request of the company.

The 1944 Season.

Method of Presenting Results.

In past Annual Reports it has been customary to present the manufacturing data in detail on an "industry" basis—*i.e.*, for the season under review, the total quantity of cane treated was considered to have yielded certain total quantities of sugar, molasses, mud, and bagasse, just as though the entire crop had been crushed by one large mill. On this basis, performance figures, such as coefficient of work, extraction, overall recovery, &c., were calculated and listed. So long as the basis of these calculated figures is kept in mind their interpretation can be quite definite. Unfortunately, however, when one deals with coefficient of work, extraction, and the like, one immediately associates the values with the performance of the actual factories, and in comparing the results of one season with those of another one is prone to attribute changes in these performance figures to changes in the efficiency of the operations of the factories. This interpretation of the values presented in past reports would be erroneous, but it is known that the figures have been frequently used in this way and wrong conclusions drawn.

The fallacy of such an interpretation may be illustrated by taking two factories with widely differing coefficients of work and considering the average coefficients of work on the "industry" basis for two separate seasons. For simplicity a constant C.C.S. value of 15 has been assumed in all cases:—

—	Season I.			Season II.		
Factory.	A	B	A & B	A	B	A & B
Tons cane	300,000	100,000	400,000	100,000	300,000	400,000
C.C.S. per cent. ..	15	15	15	15	15	15
Tons C.C.S. ..	45,000	15,000	60,000	15,000	45,000	60,000
Tons 94 n.t. sugar	45,000	14,100	59,100	15,150	42,750	57,900
Coefficient of work	100	94	98·5	101	95	96·5

On comparing the overall results of the two factories for the two seasons, it will be noted that the "industry" (or weighted) coefficient of work dropped from 98.5 to 96.5, but it cannot be said that the mills did less efficient work, as both mills recorded an increase in coefficient. Obviously the drop of two units is due to the weighting influence of the crops handled by the factories, and all that has happened is that in the second season the less efficient factory handled a greater quantity of cane than did the more efficient factory, and so the efficiency with which the total cane was converted to sugar was reduced. This has a definite and real meaning, but as already stated the tendency is to jump to the obviously erroneous conclusion that the contributing mills were individually less efficient.

Equally clear from the above simple illustration is the fact that the arithmetic mean of the coefficients of work for factories A and B provides the true value for interseasonal comparisons. In seasons I. and II. the arithmetic means were 97 and 98 respectively, an improvement in average performances of one unit of coefficient, as, indeed, was the case with each mill.

When a large number of factory results is concerned, it will be appreciated that whilst the same principles apply, the matter becomes more obscure since the relative tonnages vary haphazardly, and in such cases any attempt to evaluate the change of mill performance from season to season by means of weighted averages is futile.

This may be done only by using arithmetic averages. When such are used, however, it must be pointed out that the values so obtained for the average performance figures (*e.g.*, extraction, coefficient of work, &c.) are not equal to those calculated from the averages of the component terms (*e.g.*, bagasse and cane analyses in the case of extraction). This however, in no way reduces the value of these figures for illustrating the changes in manufacturing results from season to season.

Accordingly, it has been considered advisable to modify the method of presenting the milling results in these Reports, and to include two sets of figures:—

(1) A series of tables setting out the totals and weighted analyses of the raw material (cane) and the products (sugar, molasses, mud, and bagasse), and also total quantities of fuel, for each of the three districts—northern, central, and southern—and for the industry as a whole. For comparison, the corresponding values for the immediately preceding six years are included. These data will be referred to as "Production Data."

(2) A table, again on a district and overall basis, giving in detail the average factory performance. The figures presented are the arithmetic means of the control figures of all the factories concerned, and so give the true measure of the factory performance. For comparison a table is added giving the more important values for 1943 and 1944. For the next Annual Report, for comparative purposes, a table showing similar data for each season back to 1938 will be prepared. Data on this basis will be referred to as "Mill Data."

With these two methods of presentation, it is felt that the performance of both the industry and the mills will be adequately depicted.

Production Data.

In Table XI. are set out the total quantities of the raw material and the various products for the years 1938 to 1944 inclusive, together with their averaged compositions on a weighted basis. Unfortunately, with the exception of cane and sugar tonnages, no information is available for the four factories of the Colonial Sugar Refining Company, whilst the fuel data lack information from Pioneer and Inkerman mills also.

On comparing the tonnages of cane crushed in the three districts with estimated tonnages quoted in the Annual Report for 1944, it will be noted that in the northern and central districts the estimates were exceeded by 53,000 and 97,000 tons of cane respectively. On the other hand, the southern district failed to attain the estimate by 42,000 tons. The net result was an increase of 108,000 tons over the estimate. This, combined with an exceptionally high average C.C.S. value, resulted in a total increase of over 68,000 tons of 94 n.t. sugar above the estimate. The total yield of sugar thus was considerably greater than was anticipated and materially exceeded the target set by the Commonwealth Government. It was greater than the production of either 1942 or 1943 and was only 54,000 tons less than that of 1941, which might be classed as the last of the reasonably normal years.

TABLE XI.—PRODUCTION DATA FOR THE QUEENSLAND SUGAR INDUSTRY FOR THE SEASONS 1938 TO 1944, INCLUSIVE.
(TOTALS AND WEIGHTED AVERAGES.)

NORTHERN DISTRICT.*

——	1938.	1939.	1940.	1941.	1942.	1943.	1944.
Cane—							
Tons	2,275,927	2,378,999	2,072,079	2,062,518	1,963,175	1,430,006	1,819,552
Pol per cent.	15·74	16·18	16·26	16·27	15·06	16·10	15·89
Fibre per cent.	10·17	9·84	9·89	9·71	9·89	10·62	10·39
C.C.S.	14·66	15·10	15·18	15·21	13·93	14·99	14·64
Purity first expressed juice	89·95	90·30	90·45	90·01	89·00	89·95	90·38
Sugar—							
Tons (94 n.t.)	328,301	351,267	309,437	305,819	263,908	206,634	259,573
Tons cane per ton sugar	6·93	6·77	6·70	6·74	7·44	6·92	7·01
Pol per cent.	98·55	98·45	98·46	98·46	98·59	98·58	98·67
Net titre	97·04	96·88	96·67	96·91	97·20	97·14	97·42
Dilution indicator	34·26	39·91	34·94	34·62	33·81	32·31	28·50
Mud—							
Tons	38,022	42,671	41,814	40,446	34,864	23,045	32,285
Tons per 100 tons cane	2·80	3·11	3·34	3·23	3·01	2·58	2·98
Pol per cent.	3·19	4·01	3·72	3·67	4·32	4·08	4·75
Molasses—							
Gallons	4,603,345	4,881,846	4,527,762	4,875,551	4,816,269	3,738,134	4,174,420
Gallons per ton cane	3·39	3·56	3·62	3·89	4·16	4·19	3·86
Brix	85·14	84·84	84·07	85·40	85·05	84·91	84·71
Apparent purity	34·38	35·81	36·20	35·32	32·85	35·01	35·83
True purity	46·43	47·81	48·88	48·74	47·41	47·73	48·25
Reducing sugars	16·49	16·31	14·30	15·69	17·31	16·35	14·72
Final bagasse—							
Tons	329,513	293,473	269,202	262,501	240,685	197,909	235,132
Bagasse per cent. cane	24·27	21·40	21·52	20·96	20·68	22·01	21·72
Pol per cent.	3·53	3·54	3·31	3·30	2·67	2·83	2·79
Dry substance per cent.	46·33	50·44	50·17	50·51	51·34	51·77	51·45
Fuel—							
Tons wood	3,013	4,972	8,885	8,622	8,433	6,936	6,353
Tons coal	..	..	..	..	..	..	..
Tons molasses	14,826	17,411	9,427	5,970	16,908	12,539	12,144

* The figures for tons of cane, tons of sugar, and tons of cane per ton of sugar refer to all mills. All others exclude C.S.R. Co. mills.

CENTRAL DISTRICT.*

——	1938.	1939.	1940.	1941.	1942.	1943.	1944.
Cane—							
Tons	2,030,166	2,397,268	1,891,339	1,724,922	1,631,976	1,176,802	1,700,451
Pol per cent.	16·63	16·34	16·23	15·98	16·14	16·58	16·87
Fibre per cent.	11·40	11·36	11·37	11·37	11·22	11·95	12·07
C.C.S.	15·62	15·26	15·07	14·92	15·17	15·56	15·81
Purity first expressed juice	91·30	90·44	89·61	90·40	91·40	91·19	90·98
Sugar—							
Tons (94 n.t.)	314,574	371,259	280,777	256,923	240,458	177,527	262,254
Tons cane per ton sugar	6·45	6·46	6·74	6·71	6·79	6·63	6·48
Pol per cent.	98·67	98·49	98·43	98·71	98·74	98·80	98·91
Net titre	97·03	96·70	96·58	97·20	97·36	97·52	97·77
Dilution indicator	30·74	29·98	31·51	32·83	31·78	29·35	26·95
Mud—							
Tons	70,593	74,851	69,433	60,631	66,194	47,653	66,339
Tons per 100 tons cane	3·58	3·14	3·69	3·52	4·06	4·05	3·91
Pol per cent.	1·75	1·97	2·11	1·80	1·89	1·80	1·85
Molasses—							
Gallons	7,471,812	9,290,522	7,692,309	6,826,234	6,269,265	4,773,416	7,474,610
Gallons per ton cane	3·71	3·88	4·07	3·96	3·84	4·06	4·40
Brix	87·31	88·32	88·53	88·79	86·81	88·15	87·36
Apparent purity	37·56	35·07	35·20	35·21	38·10	37·11	37·36
True purity	48·12	47·58	46·25	46·24	47·0	46·40	47·20
Reducing sugars	12·92	14·15	15·70	15·22	13·02	14·68	14·34
Final bagasse—							
Tons	500,108	599,001	479,723	417,549	418,048	303,907	435,253
Bagasse per cent. cane	24·63	24·99	25·36	24·21	25·62	25·82	25·60
Pol per cent.	2·91	3·03	3·09	2·81	2·76	2·93	2·91
Dry substance per cent.	49·65	49·00	48·78	49·54	49·42	49·42	50·22
Fuel—							
Tons wood	10,937	7,880	8,914	6,270	6,936	10,759	11,422
Tons coal	1,205	373	641	250	171	559	642
Tons molasses	3,329	5,790	1,642	1,557	1,024	886	1,152

* The fuel figures exclude Pioneer and Inkerman mills. All others refer to all mills.

SOUTHERN DISTRICT.*

——	1938.	1939.	1940.	1941.	1942.	1943.	1944.
Cane—							
Tons	1,035,992	1,262,554	1,217,278	1,006,149	755,491	790,616	878,187
Pol per cent.	14·62	14·88	15·42	14·76	14·96	14·42	15·35
Fibre per cent.	13·66	13·70	13·40	12·93	13·85	13·64	13·39
C.C.S.	13·51	13·70	14·12	13·57	13·73	13·26	14·20
Purity first expressed juice	88·87	88·46	87·69	87·94	88·01	88·18	89·15
Sugar—							
Tons (94 n.t.)	135,261	168,896	169,232	134,603	101,314	102,286	121,713
Tons cane per ton sugar	7·66	7·48	7·19	7·48	7·46	7·73	7·22
Pol per cent.	98·61	98·66	98·53	98·80	98·86	98·90	99·08
Net titre	96·81	96·80	96·63	97·16	97·39	97·56	97·92
Dilution indicator	24·12	26·20	30·41	24·27	31·15	29·11	26·13
Mud—							
Tons	31,079	41,390	40,901	31,996	26,669	32,969	31,966
Tons per 100 tons cane	3·00	3·28	3·36	3·18	3·53	4·17	3·64
Pol per cent.	2·51	2·80	2·80	2·90	2·69	2·19	2·50
Molasses—							
Gallons	4,278,647	5,214,307	5,550,788	4,567,916	3,641,467	3,541,960	3,837,677
Gallons per ton cane	4·13	4·13	4·56	4·54	4·82	4·48	4·37
Brix	88·12	90·17	90·75	87·82	89·29	88·82	89·19
Apparent purity	39·05	38·79	37·42	36·77	38·39	39·71	38·72
True purity	46·14	46·22	46·05	45·96	46·32	47·38	46·98
Reducing sugars	10·24	10·34	13·05	12·70	12·06	10·06	11·21
Final bagasse—							
Tons	298,986	351,133	335,558	264,208	215,800	225,235	243,681
Bagasse per cent. cane	28·93	27·86	27·61	26·31	28·56	28·55	27·71
Pol per cent.	2·45	2·32	2·37	2·14	2·22	2·03	2·14
Dry substance per cent.	50·39	52·26	51·64	52·00	51·43	50·51	51·15
Fuel—							
Tons wood	13,222	11,466	10,569	8,573	7,418	15,339	11,044
Tons coal	66	50	155	158	504	1,083	602
Tons molasses	58	..	25	..	..	..	..

* All figures include all mills.

(TABLE XI.—*continued*) ALL QUEENSLAND DISTRICTS.*

—	1938.	1939.	1940.	1941.	1942.	1943.	1944.
Cane—							
Tons	5,342,085	6,038,821	5,180,756	4,793,589	4,350,642	3,397,424	4,398,190
Pol per cent.	15·97	15·93	16·02	15·75	15·51	15·80	16·15
Fibre per cent.	11·55	11·53	11·51	11·26	11·71	12·02	11·90
C.C.S.	14·84	14·82	14·87	14·64	14·43	14·72	15·07
Purity first expressed juice	90·30	89·9	89·55	89·55	89·80	89·93	90·35
Sugar—							
Tons (94 n.t.)	778,136	891,422	759,446	697,345	605,680	486,447	643,540
Tons cane per ton sugar	6·87	6·77	6·82	6·87	7·18	6·98	6·83
Pol per cent.	98·61	98·52	98·45	98·65	98·71	98·76	98·88
Net titre	97·0	97·0	96·63	97·10	97·31	97·30	97·70
Dilution indicator	30·85	31·89	32·20	31·70	32·16	31·67	27·34
Mud—							
Tons	139,694	158,912	152,148	133,073	127,727	103,667	130,590
Tons per 100 tons cane	3·16	3·16	3·49	3·34	3·60	3·63	3·57
Pol per cent.	2·34	2·78	2·76	2·66	2·72	2·70	2·78
Molasses—							
Gallons	16,353,602	19,386,675	17,770,859	16,269,701	14,727,001	12,053,510	15,486,707
Gallons per ton cane	3·70	3·85	4·08	4·08	4·15	4·22	4·23
Brix	86·91	87·94	88·10	87·50	86·85	87·34	87·10
Apparent purity	37·05	36·26	36·09	35·68	36·45	37·22	37·28
True purity	47·13	47·27	46·86	46·91	46·97	47·10	47·43
Reducing sugars	13·22	13·67	14·52	14·65	14·19	13·84	13·77
Final bagasse—							
Tons	1,128,607	1,243,607	1,084,483	944,258	874,553	727,051	914,066
Bagasse per cent. cane	25·51	24·72	24·88	23·71	24·67	25·43	24·97
Pol per cent.	3·00	3·03	2·95	2·80	2·62	2·67	2·75
Dry substance per cent.	48·64	50·24	49·98	50·45	50·46	50·57	50·80
Fuel—							
Tons wood	27,172	24,318	28,368	23,465	22,787	33,034	28,819
Tons coal	1,271	423	796	408	741	1,642	1,244
Tons molasses	18,213	23,201	11,094	7,527	17,932	13,425	13,296

* Figures for tons of cane, tons of sugar and tons of cane per ton of sugar refer to all mills.
The fuel figures exclude C.S.R. Co., Pioneer, and Inkerman mills. All other figures exclude C.S.R. Co. mills only.

The reason for the substantial increase in production over the anticipated is that up to the time of the original estimate weather conditions generally in the northern and central districts had been unfavourable for crop growth, but during the winter of 1944 ideal growth conditions prevailed. This largely negatived the somewhat pessimistic forecasts made by the mills in these districts. In the southern district the reverse was the case: Reports early in the growth of the 1944 crop suggested the likelihood of a record crop as the result of the ideal weather conditions in that district, and estimates were high; unfortunately, subsequent conditions were anything but favourable, and, as has already been mentioned, the estimated tonnages did not materialise. Even so, three mills in the southern district exceeded their peak allocations; in the central district four Mackay mills passed their peak values; whilst in the northern district none did so. In every case the production of sugar from the three districts fell appreciably below the aggregate of the mill peaks for the districts, as is shown in Table XII. The greatest disparity was in the northern district and the smallest in the central.

TABLE XII.—SUGAR PRODUCED 1944, COMPARED IN DISTRICTS WITH AGGREGATE PEAK ALLOCATIONS.

District.	Tons 94 n.t. Sugar.			Production Per Cent. Peak.
	Produced.*	Peak.	Excess of Peak over Production.	
Northern	259,562	330,000	70,438	78·7
Central	262,218	270,000	7,782	97·5
Southern	121,695	137,000	15,305	88·8
Totals	643,475	737,000	93,525	87·3

* Exclusive of local sales (a total of 65 tons).

As indicated in the first section of this Report, the acreage harvested in 1944 was the lowest for a number of years. However, the yields of cane and sugar per acre—19.8 and 2.90 tons, respectively—were higher than for the four previous years; the former value has been exceeded on only five occasions in the last 25 years and the latter on four occasions.

TABLE XIII.

TONS OF CANE PER TON 94 N.T. SUGAR (WEIGHTED AVERAGE).

1932.	1933.	1934.	1935.	1936.	1937.	1938.	1939.	1940.	1941.	1942.	1943.	1944.
6·90	7·31	6·97	6·92	6·94	6·73	6·87	6·77	6·82	6·87	7·18	6·98	6·83

The average C.C.S. of the cane was the highest ever recorded, and this accounts to a large extent for the high yield figures for the 1944 season. The average pol per cent. sugar and the net titre were the highest yet recorded in Queensland, whilst the dilution indicator was the lowest. The latter value, however, is still very close to the doubtful range, and many thousands of tons of sugar were certainly bagged too wet.

In the case of the final molasses, it will be noted that both the quantity per ton of cane and the purity were the highest to date, although the purity of the first expressed juice was particularly high. Since 1938 there has been a progressive increase in the molasses per ton of cane. A similar trend, though not nearly so marked, is evident in the individual districts.

The quantity of mud per ton of cane has increased considerably since 1938, but over the last three years has remained fairly constant. The pol content has been substantially constant.

The values for final bagasse have also changed but slightly. If anything, those for 1942, 1943, and 1944 are somewhat better than the average of previous years, but this is, no doubt, the result of lower crushing rates.

The fuel position in 1944, though considerably worse than pre-war standards, shows a marked improvement over that in 1943. The increase in crushing rate from 1943 to 1944 and the lower percentage of lost time would probably account for this.

MILL DATA.

In Table XIV. are shown in detail the average mill data for all mills except those of the C.S.R. Co. and the two small Beenleigh mills. The exclusion of the last-named is necessary, since the crushing of the two mills concerned is not regular and their inclusion would introduce large fluctuation in the figures from year to year. Furthermore, neither has a suitable factory control. For comparison with the performance of the 1943 season, Table XV. has been prepared. This shows the main average performance figures for the factories indicated above in the three districts and for Queensland as a whole for 1943 and 1944. These data are based on arithmetic averages. For the next Report this Table will be extended to cover the results of several previous seasons and so provide more scope for comparison.

General.

With the exception of Eagleby, all Queensland mills crushed during the 1944 season. The labour position, though better than that of the 1943 season, was still difficult, and a number of mills were again forced to operate on two shifts. In some instances, depending on the availability of labour, mills changed from two shifts to three and *vice versa*, but for the greater part of the season all but six mills worked three shifts. This represents an improvement on the conditions obtaining during the previous two years.

To utilise the limited railway facilities to the best advantage, it was again necessary to divert cane to the nearest mill irrespective of assignments; this was most marked in the Mackay area, where considerable overlapping of assignments exists. Table XVI. shows the tonnages of cane crushed and sugar produced by each mill, whilst Table XVII. gives the sugar production after adjustments for the diversions—*i.e.*, the sugar the mills would presumably have produced had each crushed only its own cane.

The Work of the Mills.

In the two years, 1942 and 1943, it was noted that those mills which employed only two shifts more or less maintained their normal hourly crushing rate, whereas a marked reduction in rate was recorded for the remainder. In 1944, although fewer mills operated two shifts, the average hourly rate showed an appreciable increase—in fact, the value achieved (57·33 tons of cane per hour) is greater than that attained up to 1937, and represents 90.5 per cent. of the maximum previous rate. (See Table XVIII.) Due to the high percentage of lost time, however, the average weekly rate was only 74.3 per cent. of the adjudged normal value.

Loss of crushing time declined, and in Table XIX. is set out, on a weighted basis, the actual utilisation of the total time lapse covering all mills throughout the season. It will be noted that the total time available for crushing was 69.64 per cent. of the gross total time, compared with 64·60 per cent. for the previous year. Furthermore, of the time available for crushing, 63·91 per cent. was productive in 1944, compared with 58·52 in 1943. The major reduction occurred in the time lost through cane supply, but in this connection it must not be overlooked that in 1943 mills were restricted to a maximum weekly tonnage, whilst in 1944 no such restriction existed.

The efficiency of operation of the factories, as indicated by the coefficient of work, was again lower than the standard of pre-war years, the average for all districts being 97·01. This is not significantly different from the values for 1942 and 1943. As shown in the last Annual Report, the coefficients of work for 1942 and 1943 were significantly below previous standards. Thus, 1942, 1943, and 1944 may be classed as three inferior years, when gauged by the coefficient of work.

Before attributing these low coefficients of work to inferior factory operation, one must consider all the factors involved. Firstly, in these reports the value is based on sugar weights and analyses determined at the refinery, and so any loss through deterioration in storage or in transit reduces the official production attributed to each mill. The coefficient of work is thereby reduced accordingly. In previous years very little sugar was stored on mill premises, whilst transport facilities were considerably better than at present; consequently, it would be expected that losses from these causes would have increased considerably, and would be responsible for part of the drop in coefficient of work recorded. Secondly, it is generally recognised that the percentage of trash introduced with the cane has increased appreciably during recent years; and thirdly, the quantities of green cane are becoming vanishingly small. These three factors, it is felt, have a large bearing on the current low coefficients, both directly and indirectly.

The conventional method of determining the C.C.S. content of the cane from the fibre in cane and the composition of the corresponding first expressed juice can be based logically on clean, sound cane only. Even if it be assumed that similar relationships apply equally well to trash, there is the practically insuperable difficulty of obtaining a true representation of the trash in the sample for analysis. From the practical viewpoint, therefore, the extraneous matter in the cane almost invariably results in an over-estimation of the sugar entering the factory. Unfortunately, no data are available for an accurate estimation of the magnitude of the errors so introduced. The crushing of burnt cane, particularly when undue harvesting delays occur, is generally accompanied by more difficulties in the factory than is the case with green cane; here, again, no quantitative data are available.

However, from general observations, and the increase in undetermined loss, it may be concluded that extra sugar losses in storage and in transit and inferior harvesting do contribute in some measure to the low coefficients of work now recorded when compared with pre-war standards, and, consequently, the drop in factory efficiency is not as serious as the coefficients of work so recorded would imply.

The overall average efficiency of the crushing at the milling trains show little change, the value of the reduced extraction being 95·36 in 1943, and 95·38 in 1944.

The work of the boiling house has fallen off slightly. The quantity of molasses per ton of cane has increased appreciably to 4·34 gallons in 1944, whilst in that year the highest apparent purity (38·00) was also recorded. Mud figures were also high in 1944, so that the combined molasses and mud loss would be about one per cent. (on pol in cane) greater than was the case about 1939. This increase, however, does not account for the drop in recovery since the undetermined loss is still higher than normal, whilst the bagasse loss is much the same as previously.

The mills generally produced a higher quality of sugar than ever before, the average of pol and net titre being 98·87 and 97·66, respectively. In the southern district, the average pol was 98·98, compared with 98·90 and 98·64 in the central and northern districts, respectively. However, due to the higher ash of the southern district, the corresponding net titre was second to that of the central district.

The dilution indicator of the sugar was slightly better than previously. However, in the northern district (where higher humidities are encountered and the higher percentage of reducing sugar renders the sugar more hygroscopic), the average indicator was just on the borderline of the safety margin, and if safe storage is to be assured, a substantially lower value must be maintained.

Fuel.

The fuel position has been presented in a different form this year. All types of fuel used have been converted to an equivalent bagasse of 3,300 B.Th.U. net calorific value, the conversions having been made on the net calorific value basis. In previous reports the total B.Th.U. on the gross calorific value were shown. This, however, is rather misleading, since for a given quantity of heat units (gross) the higher the quality of the fuel the greater is the proportion of available heat. Thus, on the basis of gross calorific values, bagasse and coal are not comparable. Net calorific values provide some compensation and these have therefore been adopted. Further, since bagasse is the main fuel, all other types of fuel have been converted to this form and for comparison from year to year a standard bagasse has been postulated. The fuel data on this basis are presented in Table XX. for the seasons 1938-44 inclusive.

In the column headed "total fuel" it will be noted that in all districts the minimum occurred in 1941—the disorganised crushings of the subsequent years having been responsible for the burning of greater quantities of extra fuel. Furthermore, it is well known that early in the season, when the fibre in cane and the brix of the juice are both low, extra fuel, particularly in the northern mills, is essential to enable sufficient steam to be generated. Later in the season, when the fibre and brixes are both higher, the position is much easier, and in some factories bagasse has to be wasted to avoid undue accumulation. Therefore, a simple statement of the amount of fuel consumed over a season by a mill is not necessarily a true indication of the level of fuel economy of which the mill is capable. Nevertheless, even in the year of the minimum fuel consumption there still existed ample scope for further economy, but in the northern district, at least, it is doubtful whether a fuel balance on bagasse alone could be achieved in the early portion of the season, without much more elaborate equipment than is installed at present.

TABLE XIV.—FIGURES FOR 1944 SEASON.
(*Totals and Arithmetic Averages.*)

——	Northern.	Central.	Southern.	Totals and Averages.
Tons cane crushed	1,819,552*	1,700,451*	878,187*	4,398,190*
Tons sugar made (94 n.t.)	259,573*	262,254*	121,713*	643,540*
Net titre	97·35	97·75	97·72	97·66
Tons of cane per ton 94 n.t. sugar	7·02*	6·50*	7·40*	6·93*
C.C.S. in cane	14·62	15·85	14·04	14·98
Coefficient of work	97·43	97·17	96·52	97·01
Coefficient of work E.S.G.	92·40	92·10	91·60	92·00
†Crushing rate	75·62	61·37	42·30	57·33
†Lost time, per cent.	8·46	7·46	8·23	7·99
Fibre, per cent. cane	10·42	12·16	13·60	12·25
Pol per cent. cane	15·81	16·90	15·17	16·08
First expressed juice—				
Brix	20·52	22·41	20·90	21·49
Purity	90·28	90·94	89·16	90·24
Clarified juice—				
†Brix	16·08	16·02	15·67	15·91
†Purity	90·19	89·72	88·34	89·34
Syrup—				
†Brix	69·84	70·00	67·14	68·93
†Purity	90·03	89·83	88·19	89·28
Last expressed juice—				
†Purity	76·62	78·63	77·25	77·61
†Clarified juice per 100 cane	103·07	111·15	103·88	106·59
†Dilution per cent. first expressed juice	27·63	40·43	33·54	34·88
Final bagasse—				
Pol	2·73	3·06	2·46	2·79
Dry substance	51·51	50·72	51·12	51·03
Pol extraction	96·22	95·23	95·32	95·48
Reduced extraction	95·35	95·09	95·78	95·38
Lost cane juice per cent. fibre	36·08	37·08	31·75	35·08
Final molasses—				
Gallons per ton cane	3·90	4·45	4·49	4·34
Brix	84·34	87·24	87·12	86·56
Apparent purity	36·03	37·51	39·96	38·00
True purity	48·36	47·74	48·22	48·04
Reducing sugars	14·76	14·39	11·39	13·47
Final mud—				
Tons per 100 tons cane	3·00	3·67	3·90	3·58
Pol	4·88	2·43	3·09	3·19
Sugar—				
Pol	98·635	98·904	98·983	98·870
†Reducing sugars	·392	·317	·157	·277
†Ash	·179	·160	·220	·186
Moisture	·303	·250	·221	·245
Dilution indicator	27·88	27·13	27·01	27·26
Pol balance—				
Sugar (recovery)	86·59	86·85	84·82	86·11
Bagasse	3·78	4·77	4·68	4·52
Molasses	4·88	5·52	6·70	5·81
Mud	·37	·45	·62	·60
Undetermined	3·88	2·41	3·18	2·96
Boiling house efficiency	93·90	94·76	93·66	94·20
Boiling house efficiency E.S.G.	93·50	94·52	93·36	93·91
Fuel—Calculated as equivalent bagasse per 100 cane—				
†Wood	1·063	1·995	4·306	2·603
†Coal	..	·131	·151	·107
†Molasses	1·770	·180	..	·497
†Total added	2·833	2·306	4·457	3·207
†Bagasse	22·633	27·061	29·326	26·814
†Total	25·466	29·367	33·783	30·021
Crop days	1·788*	1,781*	1,180*	4,749*

* All mills, † All mills except C.S.R., Pioneer, Inkerman, and Rocky Point. Remainder except C.S.R. and Rocky Point.

TABLE XV.—AVERAGE PERFORMANCE DATA FOR QUEENSLAND SUGAR FACTORIES, EXCLUSIVE OF THE FOUR FACTORIES OF THE COLONIAL SUGAR REFINING CO., AND EAGLEBY AND ROCKY POINT. (ARITHMETIC AVERAGES).

—	Northern District.		Central District.		Southern District.		All Queensland Districts.	
	1943.	1944.	1943.	1944.	1943.	1944.	1943.	1944.
Pol in cane ..	16·07	15·81	16·54	16·90	14·35	15·17	15·70	16·08
Fibre in cane ..	10·63	10·42	11·95	12·16	13·80	13·60	12·27	12·25
Purity—								
First expressed juice ..	89·88	90·28	91·12	90·94	88·06	89·29	89·82	90·24
*Clarified juice	89·60	90·19	90·06	89·73	87·38	88·30	88·99	89·34
*Syrup ..	89·33	90·03	90·16	89·82	87·30	88·17	88·93	89·28
Gallons molasses per ton cane ..	4·24	3·90	4·05	4·45	4·55	4·49	4·26	4·34
Apparent purity final molasses ..	34·94	36·03	37·26	37·51	40·74	39·96	37·91	38·00
Overall recovery ..	86·17	86·59	86·56	86·85	84·94	84·82	85·88	86·11
Overall recovery E.S.G.	85·79	86·22	86·23	86·55	84·63	84·55	85·54	85·81
Recovery on mixed juice	89·67	89·94	90·97	91·10	89·63	89·11	89·96	90·18
Recovery on mixed juice E.S.G. ..	89·28	89·55	90·62	90·79	89·29	88·83	89·62	89·86
Boiling-house efficiency	93·99	93·90	94·67	94·76	93·94	93·66	94·28	94·20
Boiling-house efficiency E.S.G. ..	93·58	93·50	94·30	94·52	93·59	93·36	93·94	93·91
Pol extraction ..	96·18	96·22	95·16	95·23	95·43	95·32	95·48	95·48
Reduced extraction	95·41	95·35	94·89	95·09	95·96	95·78	95·36	95·38
C.C.S. in cane ..	14·96	14·62	15·51	15·85	13·16	14·04	14·61	14·98
Co-efficient of work	97·07	97·43	96·88	97·17	96·89	96·52	96·93	97·01
Co-efficient of work E.S.G.	92·21	92·40	91·92	92·10	92·04	91·60	91·99	92·00

* Excluding Pioneer and Inkerman also.

TABLE XVI.—CANE MILLED AND SUGAR YIELD, SEASON 1944.

—	Tons Cane Crushed.	Tons 94 n.t. Sugar Made.	Tons Cane per Ton 94 n.t. Sugar.	
			1944.	1943.
Mossman	119,113	16,963	7·022	6·946
Hambledon	129,901	19,009	6·834	7·100
Mulgrave	190,073	26,006	7·309	6·945
Babinda	199,480	27,921	7·144	7·054
Goondi	166,437	22,696	7·333	7·062
South Johnstone	216,603	31,407	6·897	6·782
Mourilyan	137,542	19,727	6·972	6·847
Tully	218,645	32,115	6·808	6·783
Macknade	193,138	27,918	6·918	6·851
Victoria	248,620	35,800	6·945	6·857
Sugar—Local sales ..	..	11	..	..
Total for Northern District	1,819,552	259,573	7·010	6·920
Invicta	75,082	11,906	6·306	6·645
Pioneer	142,838	23,185	6·161	6·173
Kalamia	184,056	28,677	6·418	6·346
Inkerman	187,994	28,759	6·537	6·579
Proserpine	162,642	25,467	6·386	6·556
Farleigh	174,550	25,868	6·748	6·978
Racecourse	162,677	24,746	6·574	6·859
Pleystowe	167,872	26,115	6·428	6·550
Marian	140,117	22,282	6·288	6·608
Cattle Creek	58,610	8,339	6·631	6·897
North Eton	85,703	12,418	6·902	6·928
Plane Creek	158,310	23,956	6·608	6·854
Sugar—Local sales ..	..	36	..	..
Total for Central District ..	1,700,451	262,254	6·484	6·629
Bingera	157,729	22,642	6·966	7·441
Fairymead	162,726	22,120	7·356	7·918
Millaquin	159,289	22,708	7·015	7·713
Qunaba	74,496	10,060	7·405	7·798
Gin Gin	33,556	4,486	7·480	8·606
Isis	146,243	21,345	6·851	7·294
Maryborough	46,649	5,785	8·064	7·720
Mount Bauple	25,878	3,316	7·804	8·166
Moreton	63,863	8,374	7·626	8·076
Rocky Point	7,758	859	9·031	9·522
Sugar—Local sales ..	..	18	..	..
Total for Southern District	878,187	121,713	7·215	7·729
Total for All Districts ..	4,398,190	643,540	6·834	6·984

TABLE XVII.—ADJUSTED TONNAGES OF SUGAR DEEMED TO BE MANUFACTURED FROM MILL'S OWN CANE.

Mossman	16,963	Pleystowe	26,043
Hambledon	19,009	Marian	22,328
Mulgrave	26,006	Cattle Creek	8,842
Babinda	27,921	North Eton	12,418
Goondi	22,696	Plane Creek	23,956
South Johnstone ..	31,407	Bingera	22,602
Mourilyan	19,727	Fairymead	21,813
Tully	32,115	Millaquin	22,641
Macknade	29,854	Qunaba	10,434
Victoria	33,864	Gin Gin	4,526
Invicta	11,906	Isis	21,361
Pioneer	23,185	Maryborough	5,729
Kalamia	28,677	Mount Bauple	3,385
Inkerman	28,759	Moreton	8,346
Proserpine	25,479	Eagleby	42
Farleigh	25,735	Rocky Point	817
Racecourse	24,889	Local Sales	65
			643,540

TABLE XVIII.—AVERAGE CRUSHING RATES. (TONS CANE PER HOUR.) (*Arithmetic Average.*)

1937.	1938.	1939.	1940.	1941.	1942.	1943.	1944.
55·73	60·80	61·53	61·67	63·32	55·93	55·45	57·33

TOTAL CROP DAYS.

—	1936.	1937.	1938.	1939.	1940.	1941.	1942.	1943.	1944.
Crop days	4,809	4,497	4,822	5,163	4,558	4,034	4,432	4,270	4,749

TABLE XIX.—ANALYSIS OF GROSS TOTAL TIME FOR 1944 SEASON.

—	—	Total Hours.	Per Cent. of Gross Total Hours.	Per Cent. of Available Crushing Hours.
Available for Crushing	Crushing	54,229·06	63·91	91·78
	Lost time—			
	Manufacture ..	1,518·97	1·79	2·57
	Cane supply ..	3,340·25	3·94	5·65
	Total	59,088·28	69·64	100·00
Unavailable for Crushing	Premeditated stops and week-ends ..	25,759·28	30·36	..
	Gross Total ..	84,847·46	100·00	..

TABLE XX.—FUEL CALCULATED AS EQUIVALENT BAGASSE* PER 100 CANE (*Arithmetic Averages.*)

Year.	Wood.	Coal, &c.	Molasses.	Total Added.	Bagasse.	Total.
NORTHERN DISTRICT.						
1938 ..	·368	..	1·664	2·032	23·155	25·187
1939 ..	·557	..	1·807	2·364	21·892	24·256
1940 ..	1·226	..	1·217	2·443	21·982	24·425
1941 ..	1·230	..	·768	1·998	21·390	23·388
1942 ..	1·243	..	2·276	3·519	21·637	25·156
1943 ..	1·410	..	2·224	3·634	23·182	26·816
1944 ..	1·063	..	1·770	2·833	22·633	25·466
CENTRAL DISTRICT.						
1938 ..	1·504	·329	·542	2·375	25·317	27·692
1939 ..	·993	·058	·646	1·697	24·743	26·440
1940 ..	1·138	·019	·220	1·377	24·801	26·178
1941 ..	1·106	·047	·295	1·448	24·837	26·285
1942 ..	1·224	·046	·217	1·487	26·254	27·741
1943 ..	2·589	·189	·198	2·976	26·163	29·139
1944 ..	1·995	·131	·180	2·306	27·061	29·367
SOUTHERN DISTRICTS.						
1938 ..	4·586	·017	·012	4·615	29·855	34·470
1939 ..	2·714	·010	..	2·724	30·011	32·735
1940 ..	2·535	·031	·005	2·571	29·341	31·912
1941 ..	2·659	·045	..	2·704	28·612	31·316
1942 ..	3·197	·183	..	3·380	30·325	33·705
1943 ..	5·385	·380	..	5·765	29·358	35·123
1944 ..	4·306	·151	..	4·457	29·326	33·783
ALL QUEENSLAND DISTRICTS.						
1938 ..	2·341	·137	·621	3·099	26·432	29·531
1939 ..	1·508	·027	·692	2·227	25·956	28·183
1940 ..	1·662	·018	·382	2·062	25·759	27·821
1941 ..	1·695	·035	·302	2·032	25·369	27·401
1942 ..	1·939	·084	·633	2·656	26·612	29·268
1943 ..	3·313	·212	·613	4·138	26·598	30·736
1944 ..	2·603	·107	·497	3·207	26·814	30·021

* Equivalent bagasse = bagasse with net calorific value of 3,300 B.Th.U per lb.

By Authority: A. H. TUCKER, Government Printer, Brisbane.